Insure VICTORY ...— Buy Bonds for War ...— Push Plans for Peace

Contractors and Engineers Monthly

Vol. 41, No. 7 JULY, 1944 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Central Valley Project**
  Because of its importance to the war effort, work is being rushed on the Bureau of Reclamation's Central Valley Project in California. Two aspects of this project are described in this issue, including the concrete core wall and earth and rock fill at the east abutment of Shasta Dam, and the construction of a concrete siphon on one section of the Madera Canal which will carry irrigation water from Friant Dam to the San Joaquin Valley.
  See pages 1 and 56.

- **Work at Airfields**
  Descriptions of hot-mix paving of the perimeter taxiways at an Army Airfield in the southeast, and the grading and mixed-in-place paving at Naval Aviation Cadet training fields continue our coverage of the vast airport-construction program.
  See pages 1 and 25.

- **Special Wood Forms**
  The feature of the construction of a group of Navy ammunition magazines in the East is the use of plywood forms with special ties and spacers which eliminated the use of steel and saved both time and labor.
  See page 2.

- **New Machine Seeds**
  An ingenious mobile spray unit developed by the State Highway Department for the speedy seeding of mulched backslopes along Connecticut roadsides has greatly decreased the cost of this type of work and produces a quick sturdy stand of grass for erosion control.
  See page 9.

- **Wartime Sewer Project**
  The first of a series of three articles on the $6,000,000 sewer construction program in Bridgeport, Conn., to take care of the greatly expanded population due to that city's war industries, appears in this issue.
  See page 21.

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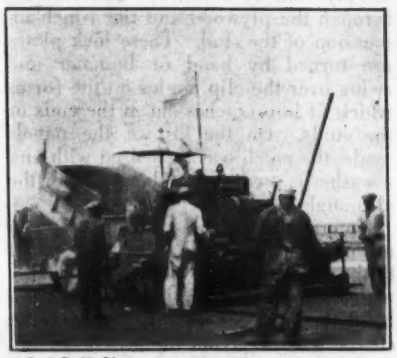


C. & E. M. Photo

The Barber-Greene finisher laying a 1½-inch hot-mix course 10 feet wide on a perimeter taxiway at an Army airfield in the Southeast.

Perimeter Taxiways Paved With Hot-Mix

Strengthening of Existing Taxiways with Widening to 75 Feet Done with Lime Rock And a Hot-Mix Top

✦ AS the final major improvement to one of the Army's southeastern airfields, the U. S. Engineer Corps supervised the extension of the existing runways to 7,000 feet, the addition of a 30,000-square yard concrete apron, and the widening and strengthening of all perimeter taxiways from 50 feet on a 5-inch lime-rock base, sand-sealed, to 75 feet on an 8-inch lime-rock base with 3 inches of hot-mix top and 25-foot stabilized shoulders on either side to prevent

(Continued on page 22)

Core Wall and Earth Fill Completed at Shasta Dam

By FRANK B. SARLES, Field Editor

(Photo on page 84)

East Abutment of Concrete Gravity Structure Modified For Economy; Difficult Haul for Fill Material

✦ ECONOMY in the use of mass concrete at Shasta Dam was achieved in the construction of the top section at the east abutment by using a concrete core wall and rock-protected compacted earth fill. This work was one of the later operations at Shasta, an important part of the Bureau of Reclamation's Central Valley Project in California.

Shasta Dam, the world's second largest concrete structure, is located on the Sacramento River near Redding, Calif. Over 6,500,000 cubic yards of concrete went into its construction; it will impound 4,500,000 acre-feet of water to be used to control floods, improve navigation, furnish water for irrigation and salinity repulsion, and operate a power plant with an installed capacity of 380,000 kilowatts.

General Features of Design

With the crest of the center section spillway at an elevation of 1,037 feet and satisfactory foundation rock available at an elevation of 980 on the east abutment, it was considered economical and advantageous to construct at that point 420 linear feet of concrete core wall 90 feet high with approximately 80,000 cubic yards of impervious rolled earth fill distributed equally on both sides. The earth fill is protected by 200,000 cubic yards of rolled rock fill of 6-inch maximum size, reinforced by over 1,000,000 cubic yards of loose rock fill in which boulders up to 1 cubic yard were used.

The core wall is 22 inches wide at its top with both faces battered 1 in 67, and is divided into monoliths 40 feet long and 10 feet high. Standard 9-inch rubber water stops of dumbbell pattern were used in all vertical joints, with sponge rubber and dehydrated cork forming the remainder of these expansion joints. The reinforcement consists of ¾-inch round rods set in each face at 12-inch centers both horizontally and vertically.

The spread foundation of the core wall encloses an inspection tunnel, access to which is gained through a manhole constructed on the downstream side of the core wall near its east end.

Forms and Concrete Placing

Sectional wood forms were used, built of 1 x 12-inch lumber nailed horizontally to 2 x 6 studs at 16-inch centers and held in alignment by double 2 x 6-inch wales 3 feet apart and joined by removable-end ¾-inch steel wall ties at 3-foot centers along the wales. The force of form builders available at any particular time varied as it was subordinated to the need for their services on other work.

Pouring of concrete progressed in alternate monoliths along each 10-foot vertical lift with a minimum of 72 hours between the pouring of vertical sections. Forms were set in place by a Lorain truck crane. The sequence of operations of building the core wall, placing four types of fill, and the limitation of a maximum of 10 feet of core wall above the fill at any one time resulted in a slow schedule on this portion of the work.

As concrete was needed, it was delivered from the central concrete plant by the elaborate cableway system (see C. & E. M. August, 1940, pg. 16) in use at Shasta Dam and placed through sectional metal spouts.

Earth and Rock Fill

A Bucyrus-Erie 120-B all-electric crane with a 90-foot boom and a 5-cubic-yard Esco dragline bucket loaded the selected material as well as the rock from stockpiles which had been formed during the excavation of the main dam struc-

(Concluded on page 19)

CANAL SIPHON UNDER FRESNO RIVER

The 25-foot sections of form are shown being erected on the Oberg Bros. contract for a 10½-foot-diameter reinforced-concrete siphon 1,025½ feet long on the Madera Canal of the Bureau of Reclamation's Central Valley Project in California. Note the wells and pumping system to keep the trench dry. See page 56.

Simplified Methods Used To Build Navy Storage Magazines

Features of Job Include Spread-Type Foundation, Concrete Forms of Plywood, Special Ties and Spacers

By THEODORE REED KENDALL, Editor

✦ THE Corbetta Construction Co. of New York City has the contract for the major portion of a new Naval Ammunition Depot in the East. The work for which this company is responsible consists primarily of magazines, buildings of various types, roads and services. In the construction of the magazines, three outstanding construction features are noteworthy. First, in order to reduce to a minimum the use of labor, as well as to speed up the work, a design using a floating or spread-type foundation was developed. This type of foundation uses a 1½-inch-thick floor for the barrel-arch-type magazines to carry the entire load evenly distributed. This reduces the amount of hand trenching necessary and permits the pouring of the foundation floor or "platter" as a monolith with the slab wall keyed to receive the barrel. The magazines are about 80 feet long x 25 feet wide with an arched roof of variable thickness and a rise of about 12 feet. The floor slab is sloped toward drainage gutters at the sides, and drains inserted in the front wall provide quick drainage from the interior of the magazine.

The second innovation is the forms. The contractor had available sufficient steel forms to equip the job only partially for the time required to complete the construction, so additional sets of simple plywood panels were designed for the inside of the barrel in combination with plywood panels for the outside. One of the reasons for the shift over to the use of plywood forms was the constant loss of the many small parts necessary to assemble the steel units and make them tight. The plywood forms, used either with channel and pipe trusses or with light structural-steel trusses, are light in weight, easily handled by fewer men, have no parts to be lost, and have been reused at least ten times and most of them fourteen times, in spite of rough handling by common labor. A total of 20 to 50 carpenters worked in the form assembly yard and turned out a total of 300,000 square feet.

The third feature of the job is the use of Richmond Tyscru form ties and spacers assembled by welding onto two continuous struts or rods which space the ties correctly and also support the 6 x 6-inch mesh reinforcement, thus greatly speeding the placing of the reinforcing after the inside barrel forms have been set. In addition to tying and spacing the forms, the continuous units reduce substantially the number of welds necessary for grounding the reinforcing mesh and spacers, and eliminate the necessity of pulling tie rods, an operation found to be difficult.

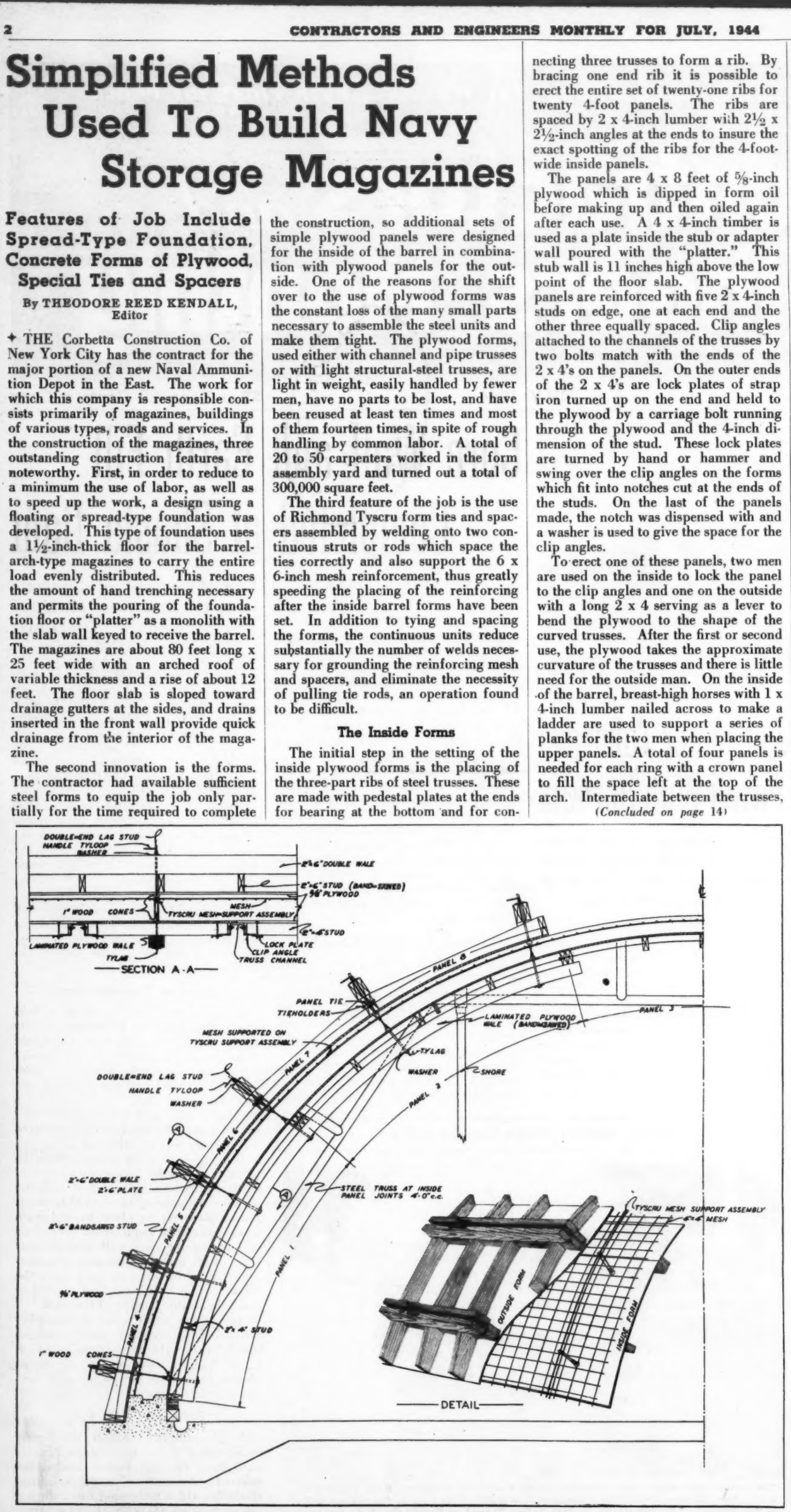
The Inside Forms

The initial step in the setting of the inside plywood forms is the placing of the three-part ribs of steel trusses. These are made with pedestal plates at the ends for bearing at the bottom and for connecting three trusses to form a rib. By bracing one end rib it is possible to erect the entire set of twenty-one ribs for twenty 4-foot panels. The ribs are spaced by 2 x 4-inch lumber with 2½ x 2½-inch angles at the ends to insure the exact spotting of the ribs for the 4-foot-wide inside panels.

The panels are 4 x 8 feet of ⅝-inch plywood which is dipped in form oil before making up and then oiled again after each use. A 4 x 4-inch timber is used as a plate inside the stub or adapter wall poured with the "platter." This stub wall is 11 inches high above the low point of the floor slab. The plywood panels are reinforced with five 2 x 4-inch studs on edge, one at each end and the other three equally spaced. Clip angles attached to the channels of the trusses by two bolts match with the ends of the 2 x 4's on the panels. On the outer ends of the 2 x 4's are lock plates of strap iron turned up on the end and held to the plywood by a carriage bolt running through the plywood and the 4-inch dimension of the stud. These lock plates are turned by hand or hammer and swing over the clip angles on the forms which fit into notches cut at the ends of the studs. On the last of the panels made, the notch was dispensed with and a washer is used to give the space for the clip angles.

To erect one of these panels, two men are used on the inside to lock the panel to the clip angles and one on the outside with a long 2 x 4 serving as a lever to bend the plywood to the shape of the curved trusses. After the first or second use, the plywood takes the approximate curvature of the trusses and there is little need for the outside man. On the inside of the barrel, breast-high horses with 1 x 4-inch lumber nailed across to make a ladder are used to support a series of planks for the two men when placing the upper panels. A total of four panels is needed for each ring with a crown panel to fill the space left at the top of the arch. Intermediate between the trusses,

(Concluded on page 14)



Half section of the forms for a Navy ammunition magazine.

An Adnun Black-Top Paver laying hot-mix on a street in Borger, Texas.

Hot-Mix Surfacing In No. Texas Town

State Highway Dept. Awards Contract for Resurfacing Highway Through Borger; Bad Winter Held Up Work

✦ A CONTRACT for resurfacing 1.666 miles of a badly damaged street used as Highway Business Route 117 through Borger, Texas, was awarded by the Texas Highway Department to the Public Construction Co. of Denton, Texas, in November, 1943, and was completed in the spring of 1944. The existing street consisted of an old concrete pavement which had been resurfaced with rock asphalt but had disintegrated to a considerable extent under the recent heavy traffic.

Where the old rock-asphalt surface was in good condition, it was left in place but, on a considerable area of the job, removal of the old surface course was necessary. This work was done by force account by the same contractor who was to place the new surface. A Caterpillar No. 12 motor grader was used to scarify and strip the old rock-asphalt surface. Since the work was done in cold weather, the pavement had a tendency to break up in rather large chunks, which were loaded into trucks and wasted, or given to the city and used in driveways and similar installations.

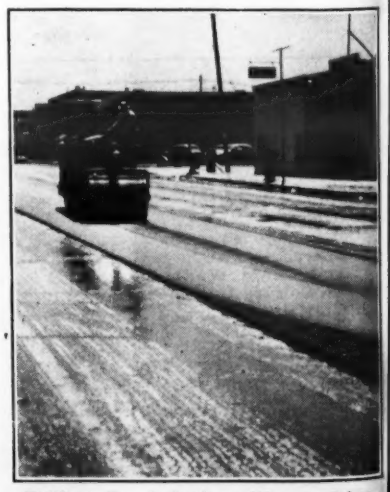
A Gardner-Denver 300-cubic-foot compressor, furnishing air to a small nozzle, was used for cleaning cracks in the old concrete base, which was then patched with the same asphaltic-concrete material used for the new surface.

Before the new surfacing was applied, the entire base was cleaned by a Grace power broom, after which a tack coat of approximately 0.08 gallon of OA-135 asphalt cut-back with 35 per cent white gasoline per square yard was applied by a 600-gallon Etnyre distributor.

The Asphalt Plant

Aggregates were shipped from the

(Concluded on page 38)



Rolling the hot-mix with an 8-ton Buffalo-Springfield tandem roller.

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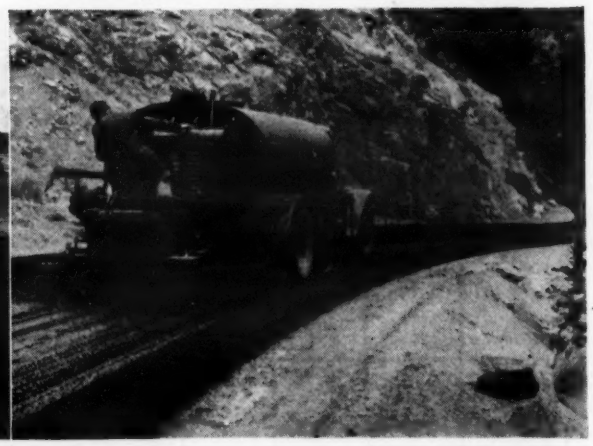

Texaco-surfaced road in **COLORADO**

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Better Post-War Maintenance For Airports and Flight Strips

The Kentucky Legislature recently passed a bill requiring the Department of Highways to maintain all municipal and county airports, at an estimated cost of $40,000 a year. This is the first such bill that has come to our attention, but a resolution passed at the recent annual meeting of the Association of Highway Officials of the North Atlantic States "urges the various state governments to consider the advisability of making their state highway departments responsible for maintaining airports and Flight Strips; the maintenance costs to be financed in part by means of a state tax levied on aviation gasoline, and in part by such other funds which may be appropriated to a public works authority of state-wide jurisdiction for this new and important responsibility."

Thus we find state highway departments facing a new activity—the maintenance of airports and Flight Strips. They have not engaged in the construction of airports, but by the very character of Flight Strips, their design and construction have been a function of the state highway departments. No funds having been provided for the maintenance of Flight Strips, the future of the considerable number that have been built is in the laps of the gods. Care of bituminous and portland-cement concrete pavements, primed and stabilized shoulders, turf areas and access roads has long been a standard activity of our state maintenance engineers so, provided that funds are appropriated in sufficient volume, there is no reason why Flight Strips anyway, and even those municipal and county airports which are adequate for post-war traffic, should not be maintained by the state highway departments.

Financing and the increased personnel are the only obstacles, but these are certainly not insuperable. Money can always be found for a worthy and necessary project and the resolution of the Association of the Highway Officials of the North Atlantic States makes a most reasonable suggestion of two sources. Man-power will probably be the least of our worries in the post-war years, so we may look forward to the more efficient and economical maintenance of our airports and Flight Strips by organizations that "know how".

FWA Announces Personnel Changes

Kenneth Markwell, former Regional Director of the Federal Works Agency in Richmond, Va., has been named Assistant Commissioner of the Bureau of Reclamation in the Department of the Interior, according to a recent announcement. Mr. Markwell has been in government work since 1933 and previous to becoming FWA Director in Richmond acted successively as Senior Engineer Examiner in the Tennessee office of PWA; PWA State Director for Tennessee; and Chief Project Engineer for PWA power developments in the Tennessee Valley.

C. L. Vickers, formerly Assistant Regional Director, succeeds to the office of Regional Director. Mr. Vickers was Resident Engineer for the West Virginia State Road Commission in 1940, and previous to that had been connected with PWA offices in West Virginia and Chicago.

The post of Assistant Regional Director in Richmond is to be filled by William F. Barrett, formerly Chief Construction Engineer, who has been a member of the Staff since its establishment in 1941, and Lewis P. Gattis now becomes Chief Construction Engineer. Pat B. Smith, Kenneth M. Adelstein and John D. Rives have been added to the staff as Construction Engineers.

WPB Urgently Needs Idle Crawler Tractors

A vigorous campaign for placing idle used crawler tractors in essential work through voluntary private sale or rental, Government purchase and sale, or, if necessary, through requisitioning is now under way by the War Production Board. As of April 1, 1944, inventory records showed that 26,834 tractors were owned by contractors and distributors, with only 499 available for sale and 905 available for rent, Henry M. Hale, Director of the Construction Machinery Division, announced. The majority of these used tractors are already at work on essential projects, but it is estimated that 4,000 idle tractors can be located and put to essential use by outright purchase, rental, or subcontract.

The program of obtaining these 4,000 tractors, as outlined by Mr. Hale, is:

1. Construction machinery specialists in the WPB field offices will locate the tractors through the inventory of used machines set up under Order L-196.

2. Construction machinery specialists will make field trips to inspect the machines listed in the inventory and to follow up leads on tractors in the hands of owners other than contractors and distributors. An endeavor will be made to persuade the owners of idle machines to sell or rent them, pointing out the critical war need, the tax relief available to sellers under Section 117-j of the Internal Revenue Code, and the fact that there will be an abundant supply of tractors available after the war.

3. The twenty-four construction machinery specialists located throughout the United States will first of all fill requirements with tractors voluntarily reported to them as available for sale, and will inspect suitable tractors and recommend them for purchase by the Defense Supplies Corp. Regional quotas have been set up by weighing the demand from each region against the number of used tractors in the region. A national revolving pool of 500 tractors is planned, if immediate applicants do not pick up the tractors as quickly as they are located.

In acquiring the needed tractors, those that are idle will be taken first; then those which are being used on non-essential work. If voluntary sale cannot be arranged, tractors will have to be requisitioned under the act of October, 1941, as amended, which provides for requisitioning after all other means of obtaining the use of property by fair and reasonable terms have been exhausted. It is hoped that sufficient tractors can be secured on a voluntary basis, and the specialists have been directed to try to arrange for the use of tractors by subcontract or rental if they cannot be purchased. Subcontracting was used to good effect in the construction programs of 1942 and 1943.

These tractors are needed principally for mining, lumbering, food and oil production. At present, 85 per cent of our tractor production is being sent overseas for military use, so the only way in which the tractor shortage on the home front can be met is by putting every used tractor in the country to work where it can best serve the war effort. If you have any crawler tractors which are not in use or for which work is not already contracted, get in touch with the construction machinery specialist in your nearest WPB field office. Keep your machines working for Victory.

"A guy with a bulldozer? I think he went that way, Sarge."

PUT YOUR IDLE TRACTORS TO WORK FOR VICTORY

Pile-Driving Problems Discussed in Handbook

In the preface to the new "Pile-Driving Handbook" by Robert D. Chellis, B. S., C. E., Structural Engineer, Stone & Webster Engineering Corp., the author points out that the lack of assembled literature covering the field of pile foundations has been a serious handicap to many engineers, particularly to those whose practice does not bring them face to face with a wide variety of pile-driving problems. The purpose of this new Handbook is to discuss the practical and theoretical factors involved, so as to assist the judgment of the engineer and aid in obtaining safe and economical results in the handling of actual pile-foundation problems, and to establish a reasonably uniform basis of interpretation of the results secured by the use of various types of piles and driving equipment.

The subjects covered include the philosophy of pile foundations, their basic principles, borings and soil sampling, test piles, and development of suggested pile-driving formulae; pile-driving analysis and application of formulae; speed, stroke and driving stresses; selection of driving equipment; selection of type of pile and methods of driving; effects of pile spacing and grouping; design of piles for loadings; types of concrete piles; and the deterioration and preservation of piles. In addition, there are a number of helpful tables and a bibliography.

Copies of "Pile-Driving Handbook" may be secured by those interested direct from the Pitman Publishing Corp., 2 West 45th St., New York 19, N. Y., or from this magazine. Price: $4.50.

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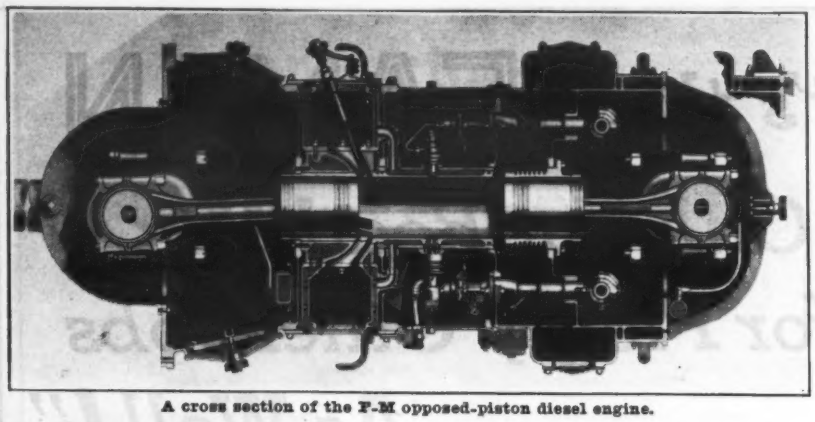

A cross section of the F-M opposed-piston diesel engine.

Opposed-Piston Type Of Diesels Available

Although the opposed-piston type of diesel engine recently announced by Fairbanks, Morse & Co. is not entirely new in the sense that the company is only now beginning its manufacture, it is new insofar as its availability for industrial use is concerned. This company started the design of this type of diesel over a decade ago, primarily for railroad use. Then along came the submarine building program, and the opposed-piston type of diesel, after gruelling tests and some improvements, was found well suited to that service. The exacting performance demanded in its application to sea duty has helped to develop an improved engine which can fit into other mobile applications. Accordingly, Fairbanks-Morse has announced that the opposed-piston diesel engine will be available for such use as war demands ease off.

The underlying principle of the Fairbanks-Morse two-stroke-cycle opposed-piston diesel engine is the use of a plain open-end cylinder in which combustion takes place in the center of its length between two pistons which move away from each other, and in doing so uncover the exhaust and air inlet ports, thus eliminating all valves. The pistons controlling the air inlet ports are connected to the upper crankshaft while those controlling the exhaust ports are connected to the lower crankshaft, the two crankshafts being mechanically connected by means of a vertical shaft and bevel gears, thereby transmitting power from the upper to the lower shaft and maintaining the proper timing between the upper and lower pistons.

Among the advantages claimed for the Fairbanks-Morse opposed-piston engines, which are made in sizes having from 3 to 10 cylinders and ranging from 150 to 2,000 hp, are compactness, simplicity, and economy. One of the principal factors in its economical performance is the uni-directional flow of scavenging air.

The engine is a complete self-contained unit with attached rotary blower, and fuel, lubricating-oil and water pumps. The main frame is of welded construction, and both crankshafts are supported in the main frame by removable bearings between each cylinder and at each end. Crankshafts and connecting rods are drilled for the passage of lubricating oil to bearings and for piston cooling, and a crankcase ventilating system is provided which also prevents oil leaks.

The scavenging air blower is of the multiple-spiral-lobe positive-displacement type, driven from the upper crankshaft by means of helical gears, and the timing of the impellers is positively maintained by precision gearing. Both exhaust manifolds are water-cooled and removable without major disassembling. The governor is of the hydraulic type and controls the quantity of fuel delivered by the injection pumps to the fuel injection nozzles. A rotary-type fuel supply pump delivers fuel from the service tank through suitable filters to individual fuel-injection pumps for the two injection nozzles in each cylinder.

Water for cooling the engine is supplied by a gear-driven centrifugal pump. The lubricating oil pump is of the herringbone gear type and furnishes lubrication for the entire engine, including main bearings, piston-pin bearings, camsh ft bearings, etc., thereby eliminating hand oiling.

Further information on these Fairbanks-Morse opposed-type diesel engines and their applicability to the construction field may be secured by those interested direct from Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

New Sales Manager For Cable and Rope Divs.

Frank W. Bemis has been made Sales Manager of the American Cable and Hazard Wire Rope Divisions of American Chain & Cable Co., Inc., according to a recent announcement. Mr. Bemis, who has been with the organization since 1938, will have headquarters at 230 Park Ave., New York City.

HERCULES ROLLERS

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We started unloading on Oct. 13th

REPORTED by The Lewis Construction Co. after paving the Marine Base runways at El Toro, Calif.

... at the Irvine siding and were in production Oct. 21st. We laid a total of 75,902 tons from Oct. 21st to Dec. 8th, inclusive, averaging 10 hours per day. It was not unusual to mix and lay in excess of 200 tons per hour.....

...with a Madsen Asphalt Plant

THE REPORT CONCLUDES, "We are attaching a detail of the daily tonnages and the hours worked".

This work sheet shows that 75,902 tons were produced in 44 days (466 hours). The average daily output for this 3000-lb. Madsen plant was 1650 tons; the average hourly output was 162.8 tons. The best day's production was 2412 tons in 12 hours.

How can a Madsen plant produce bituminous paving materials at a speed of more than twice its rated capacity? The answer is greater efficiency and improved methods. In a Madsen plant, the bituminous binder is sprayed in 7 seconds (timed by stop-watch) into the mixer from a direct center-line above the tumbling aggregates. The aggregates are spray coated as they are tossed by the mixer paddles. The binder must filter through the aggregate—not down the side of the mixer.

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Jack-Erection System and Power Lift
Overflow Bin for easy truck loading

Heavy Timber Piles Destroyed by Borers

Experience of Escambia County, Fla., Shows Weakness Of Current Protection; Road Maintenance Big Problem

(*Photo on page 84*)

✦ THE wood bridges of Escambia County, in southwestern Florida, over salt and brackish water have been the source of considerable information on the action of marine borers through the constant studies of Winston E. Wheat, County Engineer. Most of the county bridges fall into this class, although there are two major concrete bridges. The problems of county management and road maintenance are important, but the most intensive activity has been the protection of wood-pile bridges in the Pensacola area.

Bridges over fresh-water streams are in general of untreated-timber trestle and deck construction. The four bridges over salt water are: 1. a lift bridge over Bayou Chico on the Bay Shore Road between Pensacola and the U. S. Naval Air Station, an all-concrete structure with a Scherzer rolling steel lift-span; 2. another similar Scherzer rolling lift-span bridge over the Intracoastal Waterway between Pensacola and Mobile, with a concrete substructure and deck; 3. a long bridge over Perdido Bay, consisting of a creosote-treated-timber substructure, the piles encased in concrete, with a concrete deck. This bridge has no draw. The encasing was placed by the county to counter the destruction of the piles by marine borers. The thin sheet-metal forms were left in place and have largely rusted away, leaving the dense concrete as the protective material against the borers; 4. the Santa Rosa Sound bridge, a treated-timber substructure and deck except for a steel swing span. This was built by private interests and was bought by the city of Pensacola in 1943 and turned over to the county for maintenance. It leads to a national monument and in normal times has carried heavy traffic. In 1941, as an emergency measure because of the rapid loss of cross section in the piles by the attacks of marine borers, the trestles were strengthened by driving additional piles on the outside of each bent. No further work will be done on the structure for the duration, and then it is hoped that as a post-war project the Federal government will replace the structure by a concrete bridge leading to the national monument.

Summary of Borer Studies

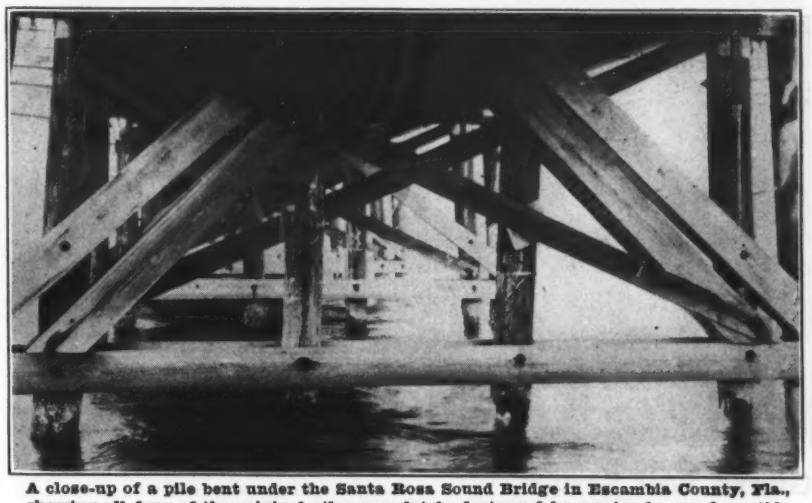
The extent of studies made by Mr. Wheat is known nationally. His office contains examples of the destruction of both untreated and creosoted piles, both dry and samples preserved in alcohol. The salt-water borer, the teredo, will not go through creosoted piling, but the small limnoria will, and when they have completed the destruction of the outer heavily impregnated shell of timber, the teredo will take over and bore deeply into the pile. In brackish water the sphaeroma damages the creosoted pile, and the action of the bankia is almost identical to the teredo.

To design a salt-water structure properly, it is essential to determine first which of the many species of borers inhabit the water in the vicinity. This is well illustrated by the fact that at some points on the U. S. coast line there have been found borers which attack rock. Obviously concrete would not afford protection at those places.

County Roads

Escambia County is 880 square miles in area and has 1,200 miles of county roads, of which only 25 miles have a bituminous surface and the balance is a natural sand-clay, or topped with sand-clay. In the sandy areas where there is little or no traction, the clay has to be

(*Concluded on page 28*)



A close-up of a pile bent under the Santa Rosa Sound Bridge in Escambia County, Fla., showing all four of the original piles completely destroyed by marine borers from tide level down. The bridge is now supported by two new piles, one at each end of the "cap", with the load from the center of the cap carried to the new piling by a timber truss or bracing.

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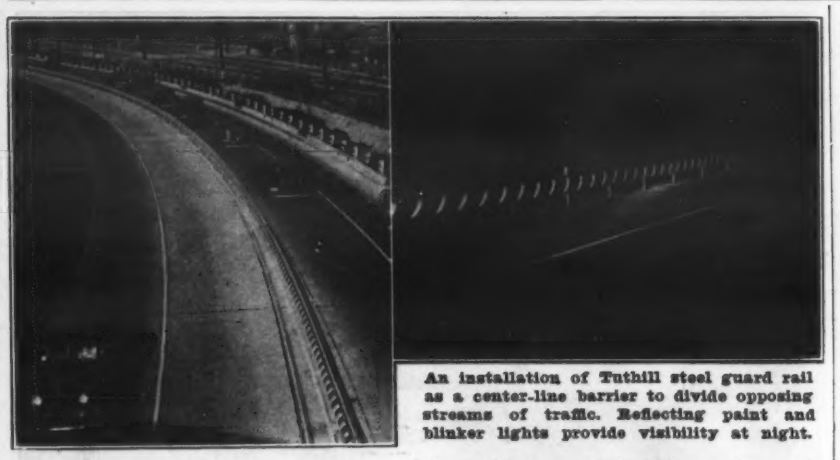

An installation of Tuthill steel guard rail as a center-line barrier to divide opposing streams of traffic. Reflecting paint and blinker lights provide visibility at night.

Guard Rail Serves To Divide Highway

One of the problems facing the engineers engaged in planning our post-war highways is that of providing for the safe and efficient movement of traffic in urban areas. The need for development and improvement of our urban highways is being greatly stressed in discussions of a post-war highway program, but there are many factors involved in this problem which do not arise in the construction of wider safer highways in the rural areas. It is generally conceded that the divided highway is the safest highway, but the cost of acquiring the necessary right-of-way for this type of construction in urban locations is very high, often prohibitive.

An example of a solution to this problem exists in Los Angeles, Calif. Ramona Boulevard, in the downtown traffic area, was the scene of many serious traffic accidents and it became apparent that measures must be taken to eliminate these accidents, most of which were caused by head-on collisions, sideswiping and driving into bridge abutments. The need for separating opposing traffic was obvious, but the Boulevard is bounded on one side by the Pacific Electric tracks and on the other by very high hills, so it was not possible to provide a wide dividing strip.

Separation of traffic was accomplished by taking Tuthill steel road-guard sections and installing them back to back, using one post for mounting the two required brackets which were attached to the post near the ground level and which are so formed that the two rails are approximately 5 inches apart. By using a special-analysis spring steel, scientifically heat treated, the posts have a high tensile strength of 165,000 pounds per square inch. The special treatment of the posts gives great shock-absorbing assistance to the double-acting spring steel brackets on which the rail is suspended. The convex rail presents a smooth surface at hub-cap height and is installed in sections of 12-foot centers on the straightaway and 10-foot centers on curves. To safeguard against any danger to night traffic, the rail was painted in alternating black and white stripes, a reflecting paint being used on the white stripes, and blinker lights were installed every 100 feet.

Engineers of the Tuthill Spring Co., 760 Polk St., Chicago 7, Ill., are now looking forward to the time when steel guard rail will once more be available for civilian use, and will be glad to work with highway engineers on plans for using steel guard rail as a center divider in locations where a wide center dividing strip is impracticable or impossible. James P. Philip, who was recently named Sales Manager of the Tuthill Guard Rail Division, is devoting all his time to planning the adaptation of steel guard rail to the highway needs of the future.

New Paint Vehicle Replaces Linseed Oil

The shortage of linseed oil and other products used in paints has presented a problem to state and county highway engineers charged with the responsibility of maintaining bridges, guard rail, sign posts and other structures along the highways. In many cases, highway department specifications have had to be revised because the scarcity of materials made it impossible to meet them.

A new paint vehicle to be used instead of linseed oil or turpentine for thinning paints is made by The Pinola Co., P. O. Box 1262, Savannah, Ga. Manufactured by distillation of oils under a protected formula, this Pinola Two-In-One Paint Vehicle has been in use for several years, during which time it has been subjected to many tests which, the manufacturer states, show that paint jobs on which the Pinola product was used stand up just as well as those done with paints mixed with linseed oil or turpentine. It is claimed that Two-In-One adds life and elasticity to the paint, and prevents cracking and peeling.

Pinola Two-In-One Paint Vehicle may be used in any types of paints or with any paint pigment with which linseed oil or turpentine is mixed and is available now for civilian use. Further information on its applications may be secured direct from the manufacturer by referring to this item.

Swan-Finch Names Sales Mgr. of Tractor Division

Carl C. Taleen has recently been appointed Sales Manager of the Tractor Division of the Swan-Finch Oil Corp., Chicago, Ill. Mr. Taleen is accredited with the original idea of establishing a separate Tractor Division and, since joining the Swan-Finch organization in 1933, he has devoted all his efforts to the development of that department.

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2 Teeth located in extreme outer corners of lip assures wide bites which reduce digging resistance of lip.

3 Tapered socket type teeth are kept tight continually by digging pressure, but are easily removed by light tapping from behind. No stress on the key at any time.

4 Cradle in digging side permits easy handling of large rocks and concrete slabs too big to enter dipper.

5 Hinges placed wide apart give greater strength to the door and are set ahead so that door has easy and positive latching.

6 Curved door eliminates usual void or "hard-to-fill" corners of the square box type dipper. Failure to get a completely filled dipper wastes about 10% capacity.

7 Tapered sides and back and the curved door provide a large discharge opening that assures faster dumping — saves time in handling wet, sticky material.

8 Latch mechanism is of very heavy duty construction. Latch keeper is cast integral with front and has easily renewable wearing piece.

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Ask for Catalog 44

Templeton, Kenly & Co., Chicago 44, Ill.

Fast Slope Seeding By Machine Spraying

Effective Pump Unit Used In Connecticut to Place Wet Mix of Earth, Seed and Fertilizer on Heavy Mulch

(*Photos on page* 84)

✦ CONSTRUCTION engineers are familiar with "inverted penetration" in asphalt road construction but "inverted seeding" of backslopes on a highway might sound strange. In Connecticut, John L. Wright, Director, Bureau of Roadside Development, State Highway Department, has found that a roughly graded slope can be stabilized most quickly to prevent erosion by covering with a mulch of hay about 6 inches thick and then spraying over it a thin mud containing the grass seed and fertilizer. This results in a good stand of grass as quickly as by any other method and at one-sixth the cost.

The first machine used for this work in Connecticut was a Mud-Jack which pumped the mixture through a 2½-inch fire hose to a nozzle into which a 1½-inch air line fed by a compressor supplied the pressure for spraying. The fire hose filled with mud was too heavy for one man to handle, requiring excessive man-power to operate the outfit. However, despite these handicaps, the results secured were so much beyond expectations that the Bureau set about developing another less cumbersome and more effective machine at the Lisbon shop of the State Highway Department.

The New Mud Spray Outfit

The new machine developed and used throughout the 1943 seeding season was more streamlined, lighter and, being a separate unit mounted on skids, could be used on any flat-bed truck. Certain limitations in the machine have led to revisions in design, and alterations were completed early in the spring of 1944 so that the new machine, shown in the illustrations, is exceedingly busy on its mission of seeding backslopes this summer.

The foundation of the machine is a pair of 4 x 6-inch timber skids 12 feet long and spaced 4 feet apart. Pipe standards on these skids support a 500-gallon cylindrical tank, mounted transversely, and a wooden agitator tank. These units are cross-braced to prevent sway.

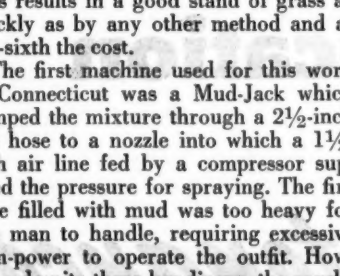
Power for driving the 1-inch transfer pump as well as the large delivery pump, the agitator paddles and the loading conveyor is supplied by a 6-cylinder Chevrolet motor of 35 hp. Power is transmitted to these various units by single, double, and multiple V-belts. After the engine is started, a clutch is thrown in which starts all of the belts in operation with the exception of the conveyor. A novel lever and cam device tightens the V-belt on the conveyor drive to start it when needed.

Water from the 500-gallon storage tank is pumped to the agitator tank by the 1-inch transfer pump. The selected loam for the "mud" is delivered by two 3-ton dump trucks. The conveyor belt is raised to rest in the truck body and two men shovel the loam onto the conveyor which delivers it in a steady stream to the agitator. A hand crank below the agitator tank is used to raise and lower the conveyor to reach conveniently any elevation of truck body. The agitator paddles are ¼ x 2-inch pieces of strap iron welded to a central shaft and rotated at about 850 rpm. Seed and fertilizer are emptied into the wood-stave U-shaped agitator tank by hand. A 4-inch rubber suction hose from the agitator tank delivers the material to the distributing pump which discharges the mud slurry through a 1½-inch rubber hose to a flat spray nozzle.

The cost of seeding high backslopes in Connecticut has been cut from 20 cents per square yard to 3 cents by this mobile spray unit.

With this set-up only one man is required for the actual spraying of the mud on the mulch, one man to attend the engine and the clutches of the machine, and two to deliver the earth to the 18-inch x 7-foot belt conveyor. The actual working width of the conveyor is cut

(*Concluded on page* 58)



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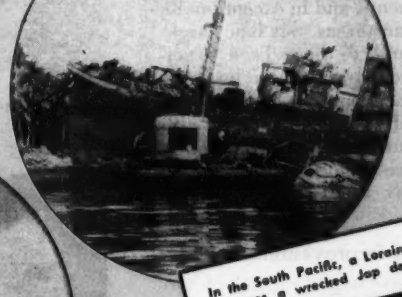
In London, Lorain Moto-Cranes clear away wreckage after the London "Blitz".

In Italy, a Lorain scoops up debris from a bombed building to clear the way for the advance.

In the Aleutians, when it isn't snowing or freezing, Lorains have mud conditions such as this to contend with.



In the South Pacific, a Lorain Crane salvages a wrecked Jap destroyer.

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Right now, these jobs in Italy, the Aleutians, in Britain and the South Pacific are full-time operations for Lorains, but there are other big jobs coming up; the postwar program of equally important, necessary, at-home jobs.

Lorains will again be available for whatever material handling job that comes your way, but with this essential difference; because of their wartime experiences, improvements and developments, Lorains will be equipped even better, to serve you profitably.

You'll be wise in starting to find out about these better Lorains by getting in touch with the Lorain Distributor in your territory right now. He has the facts, the experience and the facilities to serve you well and wisely in planning your postwar equipment setup.

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Pennsylvania Plans Future Highway Work

A Balanced System, To Meet Requirements of Modern Traffic, Is Goal; Needs Exceed Finances

By JOHN U. SHROYER, Secretary of Highways, Pennsylvania Department of Highways

✦ WITH few exceptions, the 40,600-mile state highway system in Pennsylvania is meeting in a satisfactory manner the traffic requirements of a war economy, but the postponement of necessary reconstruction during the war period is adding rapidly to the backlog of vitally needed reconstruction and modernization of the system. Pennsylvania's highway problems are most diversified. Thousands of miles of the highway system have been in service for 20 years or more; additional thousands of miles are from 10 to 20 years old. In improving and modernizing such a vast system, all factors applicable to the situation must be considered, and alignment, grades, width, depth and sight distance must be adequate to meet the demands of modern traffic and provide maximum safety for the users of our highways. This problem would be greatly simplified if there were no limits upon the financial resources available to complete the job.

It is the policy in Pennsylvania to construct adequate highways; not colossal monuments. We shall construct two, three and four-lane highways to meet traffic requirements, and in exceptionally congested urban areas, six-lane highways. Our standards have been developed and improved at regular intervals to provide the best possible highway system, which will be well balanced, with all roads adequate from a construction and maintenance standpoint, and not an overbuilt facility for a small group of theorists.

Needed Improvements

A detailed inspection of our state highway system by our field engineers discloses that an expenditure of $500,000,000 for improvement and modernization will be necessary within the next five years to provide the proper facilities for post-war traffic requirements. Of this amount, more than 90 per cent should be expended on the highways and streets carrying 1,500 or more vehicles per day, which have been bearing the brunt of the war traffic. The remainder would be required on the secondary system, which reaches into every community in Pennsylvania and affects materially the welfare of all its citizens.

An analysis of a $100,000,000 annual state highway improvement program shows the following approximate division of functional costs:

Right-of-way	$ 10,000,000
Department-force construction program to stabilize maintenance organization throughout the year	10,000,000
Construction by contract	80,000,000
Total Program	$100,000,000

The right-of-way costs are premised on average conditions, but a large volume of urban construction would increase this cost very considerably.

The expenditure of $10,000,000 a year for improvements by Department forces is considered necessary to provide employment during the construction season for approximately 3,000 employees who are necessary during spring and winter maintenance, supplementing the 7,000 regular employees required for normal maintenance activities.

Contract construction of $80,000,000 a year can be accomplished by the contractors available in Pennsylvania for this type of work, and the state can supply the necessary materials for such an undertaking without any strain on available sources of supply.

The present maintenance and Department-force construction organization of approximately 10,000 men will be adequate to meet all maintenance responsibilities if the war ends in the reasonably near future.

On an $80,000,000 annual state highway contract construction program, it is safe to assume that 25 per cent, or $20,000,000, would be expended for direct labor on the job site. This sum would provide work for approximately 15,000 men a year. Assuming that for every man on the job, 2¼ men are necessary to produce and manufacture the required equipment and materials, a program of this magnitude would provide for the employment of approximately 33,000 men in industry, making a total employment of 48,000 men on the job and on the supply lines. It is obvious that this would be a decided asset in providing employment during the post-war period to aid private industry in maintaining the civil economy of our nation.

Financing the Program

In planning our post-war program, we feel we are considering minimum needs, premised on our latest standards. Anticipating a return to 1941 motor-vehicle receipts, but not including the one-cent gas tax for relief and similar assistance, there would be a total of ap-

(*Concluded on page 42*)

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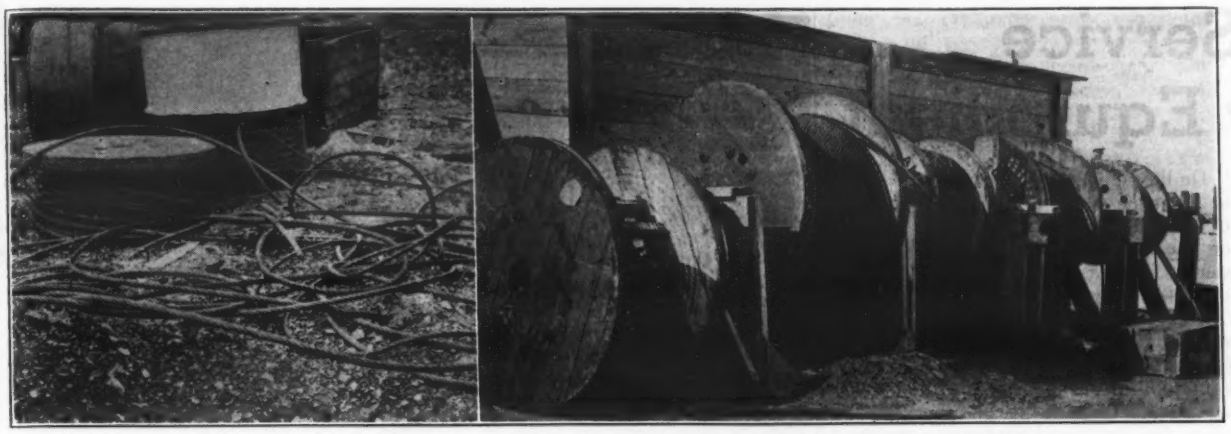

Left, wanton waste of precious material; right, the proper way to store wire rope on the job.

That's a Swell Way To Kill a U. S. Soldier

If you knew someone who bought a jeep, abused it terribly, and then threw it away when only one-quarter of its usefulness was gone, you would cry "Sabotage", because you know that our soldiers on a world-wide fighting front *need* jeeps. Well, pictured on the left above is a comparable crime. That abused and discarded reel of wire rope probably cost about as much as a jeep, and wire rope is sorely needed by our armed forces.

This sort of criminal carelessness is akin to sabotage; it is a needless waste of valuable materials and, incidentally, it's a swell way to add more names to American casualty lists. Quite possibly the name you add might be your nephew or your son, or the lad who used to be your water boy, or the kid who lives up the street.

This is obviously a reel of preformed wire rope, because the ends have no seizing; in spite of the snarled condition of the rope, there are relatively few dog's legs or kinks, and there are no broken crown wires to tear hands or clothing. Fully one-half and probably more of the rope's usefulness is still on the reel, but even this has been rewound carelessly, then left in the dirt and mud to rust and destroy itself. The guy who left this rope in this condition should have been fired, and then inducted into the infantry and given a winch truck to drive, which would teach him the priceless value of steel cable. In this reel of discarded rope, there are lengths of perfectly good cable, well suited to boom line service, guy lines, hand rails, and any one of a dozen other applications.

In direct contrast to this type of aid-to-the-enemy waste is the picture on the right which shows reels of wire rope properly mounted above mud and grit, in such a way that needed lengths may be taken from the reels in a straight non-kinking manner. Here is an operator who thinks with his brain instead of his brawn. Even here, in this workmanlike storage of rope, it would have been comparatively easy to build a roof extension from the adjacent shed and thus provide a rain shelter for the reels. Wire rope is an intricate precision-made machine, of priceless material, having many interrelated parts. As such, it deserves proper care and maintenance.

Back the attack by buying—and keeping —U. S. War Bonds!

Booklet on Maintenance Of Fire Extinguishers

The importance of regular inspection and proper maintenance of fire extinguishers to keep them in fighting trim, and the best means of doing it, are treated in a booklet entitled "Inspection and Maintenance of First Aid Fire Extinguishers", the latest addition to a series of similar manuals issued by Walter Kidde & Co., manufacturer of fire-fighting equipment.

Besides outlining maintenance procedures and record-keeping by a responsible person, the booklet includes important information on the classification of various types of fires, the code marks of the Underwriters' Laboratories which appear on all accepted extinguishers, as well as helpful suggestions for the proper placing of equipment, how to mark it so that it can be located quickly in case of fire, and the necessity for demonstrating how the different types operate so that workers will be familiar with their use. The booklet is well illustrated with photographs, drawings and charts.

Copies of the booklet may be secured by writing to Walter Kidde & Co., 140 Cedar St., New York 6, N. Y. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

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IN soggy tropical jungles . . . in muck and mud of Alaska . . . on bottomless roads in Russia . . . on the rugged hills of Italy . . . the mighty power of military crawler type equipment with *controlled differential steering* has been proved again and again.

Controlled differential steering is, and has been for 25 years, an *exclusive* operating feature with Cletrac. We call it *Tru-Traction,* because it gives power on *both* tracks at *all* times, and the ability to steer with the tractor under full control—uphill and down.

Today, practically all high speed military crawler type equipment uses *controlled differential steering* which is exclusive with Cletrac in the crawler tractor field.

In civil activities as in military movements . . . in logging camps . . . in highway construction . . . in oil fields . . . for heavy hauling, bulldozing or earth moving, wherever the going is tough—Cletrac can be depended upon to do the job—and do it economically.

A substantial number of Cletracs are being released for essential civilian use—allocated according to government regulations. Your Cletrac dealer will gladly assist you in making application for a new Cletrac if you can qualify as an essential user.

• • •

Illustrated at the right, below, is a folder recently published, telling of Cletrac's part in the war effort. A copy will be mailed on request.

*Tru-Traction is power on both tracks at all times.

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CLETRAC Tru-Traction TRACTORS

How Forest Service Cares for Equipment

Main Equipment Depot At Arcadia, Calif., Keeps 1,000 Construction and Maintenance Units in Repair

Part II

(*Photos on page 84*)

✦ WARTIME maintenance of the 650 pieces of automotive equipment and 350 tractors, graders, scrapers, fire pumps, and other heavy machinery whose continued operation is essential in the National Forests and the Emergency Rubber Project in southern California is performed in a well-equipped and adequately staffed shop of the U. S. Forest Service at Arcadia, Calif. This is one of four main equipment depots operated by Region 5 of the Forest Service. The other depots are located at Redding, Salinas, and Stockton and are staffed, equipped and operated in the same general manner as the Arcadia Depot. Branch shops render supplementary services in preventive maintenance and field replacements but heavy repairs to complete units or assemblies from them, such as motors, transmissions, and differentials, are performed at the main equipment depot.

The Arcadia Depot serves the Cleveland, San Bernardino, Angeles, Los Padres, Sequoia, and Inyo National Forests, as well as two units of the Emergency Rubber Project in the southern part of California. Branch shops, supervised by personnel from the main depot, are located in each forest and on each unit of the Emergency Rubber Project.

The Arcadia Shop occupies approximately 10 acres enclosed by a woven wire mesh fence, adjacent to the headquarters yard of the Angeles National Forest. It consists of twelve buildings of varying sizes housing separate departments, with a two-level unloading ramp for heavy equipment and a rack 12 x 20 feet in plan and 8 feet high, with separate sections for the storage of steel rods and plates. The entire area is flat and well drained, and can be utilized for open storage as desired.

Offices and Warehouses

Entering the shop area from the east through the grounds of the Angeles Forest headquarters yard, the visitor finds on his left a one-story building 20 x 50 feet in size where the Depot Area Superintendent and the Supervising Mechanic have their offices, along with the office manager and a staff of ten clerical employees. In this building the bi-weekly meetings of the department heads are held at night for the discussion of problems of personnel and procedure. Immediately west of the office is another building of similar size and construction housing the wash rooms and hot and cold showers. It also contains 38 steel lockers equipped with combination locks, and a well-furnished bedroom to house two transient truck drivers or other government employees.

On the right side of the entering drive and starting opposite the office is a line of buildings ranged along the north line of the property and opening to the south. The easternmost of these buildings, 48 feet wide and 160 feet long, is the warehouse for parts and supplies, with a loading dock at truck-body height on the south side and west end, and with four overhead doors on the south and one on the west. It contains a small office for the purchasing and issuing clerks, parts shelves, racks, and bins for storage of numerous small items, and is equipped with gas-fired unit heaters.

Machine and Blacksmith Shops

Just west of the warehouse is a double building, consisting of two 32 x 80-foot standard Forest Service buildings such as are used for branch shops, and housing the blacksmith shop in its western end and the machine shop on the east. The well-daylighted machine shop

(*Continued on page 52*)

The lubricating department of the Forest Service Equipment Depot at Arcadia, Calif., showing the pressure lubricating equipment and the oil dispensing tanks.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
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Next Winter's Snow Removal Equipment Must be Ordered NOW!
Snow storms won't wait for equipment that's late! Check your snow removal equipment now — while there is still adequate time to plan your needs, to make comparisons of various equipment and insure delivery when needed.
Take the first step today! Write for information on powerful and effective Walter Snow Fighters; the only units that provide a Four Point Positive Drive system to give greater traction, power and speed. Models to meet all snow conditions, including the new 250 H.P. Super Snow Fighter which can clear 28 feet in one run, at 20 to 30 m.p.h. — keeping runways clear throughout the worst blizzard. Snow is thrown and dispersed far to the side, to prevent the formation of dangerous snow banks.
Walter Snow Fighters are carefully engineered, highly specialized equipment that can not be hastily manufactured nor delivered on short notice. Plan now — order early — and be ready for the first snow next winter.
WALTER MOTOR TRUCK COMPANY
1001-19 Irving Ave., Ridgewood 27, Queens, L.I., N.Y.
Deliveries are now being made on Walter Four Point Positive Drive Tractor Trucks and Snow Fighters for essential civilian needs. The War Production Board has authorized the production of various models, in addition to the military requirements.
WALTER
SNOW FIGHTERS

A. M. Guthrie Promoted By Buckeye Ditcher Co.

The promotion of A. M. Guthrie from District Manager to the position of Field Sales Manager has been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. For the present Mr. Guthrie will be located at the plant in Findlay but as post-war plans materialize, he will travel extensively. His duties will include the handling of all distributor policies and appointments through the company's district managers.

New Dresser Officials

Announcement has been received from Dresser Manufacturing Co., Bradford, Pa., of the election of J. B. O'Connor as Executive Vice President and Arthur R. Weis and Lyle C. Harvey as Vice Presidents. Mr. O'Connor, who also holds office with several Dresser subsidiary companies, was connected with the Prairie Oil Co. and the Socony Vacuum Oil Co. previous to his association with the Dresser organization. Mr. Weis is President of the Pacific Pump Works of Huntington Park, Calif., and Mr. Harvey is President of the Bryant Heater Co. of Cleveland, Ohio, both Dresser subsidiaries.

Link-Belt Speeder Dealer

The Joseph L. Rozier Co., 4480 Hunt Ave., St. Louis, Mo., has been appointed by the Link-Belt Speeder Corp., Chicago, Ill., to handle the sale and service of its excavating machinery and cranes in the St. Louis territory. E. E. (Bud) Warner, equipment engineer, will be associated with this distributor organization.

How TOURNAPULL SPEED cuts Costs and increases Profits

You can profitably handle both long and short hauls . . . move more yardage with fewer units . . . save on equipment cost and get lower net cost per yard.

Tournapulls, like all big-capacity scrapers, are designed for pusher loading. They load quickly, haul and spread their own loads, are one-man operated. Because of their large diameter pneumatic tires of large cross section — plus low pressure and greater ground area — Tournapulls operate over concrete without surface damage, travel between jobs under their own power, thus save on freight.

TOURNAPULLS operate from 2.6 to 14.9 m.p.h. — that's 2 to 3 times faster than the fastest tractors. Chart here shows what this greater speed can mean to you in extra yardage.

ONE-WAY HAUL DISTANCE—CU. YDS. PER HOUR*

Tractor-drawn Scrapers:	400′	600′	800′	1,000′	2,000′	3,000′	4,000′	5,000′	6,000′
30-Yd. Capacity	—	—	175	153	97	71	56	46	39
23-Yd. Capacity	—	187	162	142	89	65	51	—	—
18-Yd. Capacity	196	163	139	122	74	—	—	—	—
15-Yd. Capacity	170	142	121	106	65	—	—	—	—
With 15-Yd. Super C Tournapull you get:	200	180	168	156	116	91	76	65	55

*All units pusher loaded on level.

Note that even on short hauls — 400 to 1000 feet one-way — Tournapulls compete very favorably with larger tractor-scraper outfits. While on longer hauls — 2000 to 6000 feet — Tournapulls move from 19% to 41% more than even a 30-yard tractor-scraper outfit — with less first cost and less cost per yard.

Figure 10,000-Hour Profit

As an example, take the extra yardage a Tournapull will move over a 10,000-hour working life on a 2000-foot, one-way haul. It varies from 190,000 to 510,000 pay yards, depending on comparative scraper size. *Estimate the profit to yourself on this extra yardage at your own usual bid price!* Can you afford to use more expensive, slower-moving rigs, when this *extra yardage* can be yours with the fast-moving, rubber-tired power of Tournapulls? Figure NOW to use job-proved Tournapulls on your postwar jobs. It will pay you—in first cost, lower cost per yard and greater profit each working hour.

LeTOURNEAU PEORIA, ILLINOIS · STOCKTON, CALIFORNIA **TOURNAPULLS**

Also, LeTOURNEAU (Aust.) Pty., Ltd., Rydalmere, New South Wales, Australia

RUBBER-TIRED POWER FOR FASTER EARTHMOVING

Mfrs. of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. Off.

Form Work Features Navy Magazine Job

(*Continued from page 2*)

the inside forms are reinforced by curved laminated plywood wales of three 2 x 5/8-inch strips of plywood tied in on 2-foot centers.

When the inside forms for the barrel are completely assembled, two rows of 4 x 4-inch posts are placed as shoring under the ends of the steel trusses to carry the load of the concrete during pouring to prevent deformation of the forms.

Tying and Spacing the Forms

After the inside forms are in place, the form-tie assemblies are installed. The assembly used is the standard Tyscru unit, welded at one end perpendicular to two continuous struts or rods which automatically spaces them according to the plans for the particular part of the forms where they are to be used. These struts or rods also act as support for the 6 x 6-inch mesh reinforcement of No. 4 wire. The necessary setback is provided by 1-inch wood cones against the Tyscru coils. The exterior members of the ties are a double-end lag stud which screws into the coil, a flat washer against the double wale, and a wire loop used as a handle to tighten the ties.

The fabric mesh is welded to continuous Form-Ty assemblies at intervals, to tie together and ground all steel units in the barrel, and is cut and the wire turned up every 2 feet to prevent the mesh riding on the concrete as poured and coming up against the outer form of the barrel. The mesh is also turned down from the barrel at the ends and back into the end walls to provide a tie. The only reinforcing in the end walls above the barrel is a series of radial rods similar to, but lighter than, the rods in the bottom 5 feet of the barrel.

Outside Arch Panels

The outside barrel forms are built of 5/8-inch plywood in 8-foot panels of varying widths and are placed horizontally with 2 x 6-inch plates at the horizontal edges and 2 x 6-inch studs on 16-inch centers, band-sawed to the outer radius of the barrel. Panels are applied directly against the wood cones which space them properly from the inside form with double-end studs passing through panel joints. Pre-assembled 2 x 6-inch horizontal wales are added over the lag studs and locked by means of flat washers and coarse-thread handle Tyloops.

The time required for the assembly of a complete inside form for a magazine by a crew of sixteen men is seven hours, with the outside forms completely assembled in about the same time immediately thereafter.

Forms for Barricade Walls

The barricade walls opposite the entrance end of each magazine are of two types. One is entirely separate from the magazine and the other attached at one end to the magazine to form a retaining wall for backfill. The barricade walls have a maximum height of about 12 feet and are 43 to 61 feet long, tapering toward the ends, and varying in thickness from the bottom to the top as well as from the middle to the ends.

The forms for the barricade walls are also of 5/8-inch plywood in 4 x 8-foot panels with 2 x 4-inch studs on 16-inch centers and double 2 x 6-inch wales. The studs on the vertical edges of the panels are scarfed to permit the tie-rods to pass through. Richmond Tyscrus, designed for a 12,000-pound safe load, are used on 4-foot centers, thus caring for 16 square feet of wall per tie, and permitting a faster pour with a minimum number of ties. The forms for the end walls of the magazines are the same as the barricade walls, except that the panels are run horizontally and are tied to the barrel forms by heavy wire to prevent spreading.

Concreting

The sequence of pouring the magazines is as follows: 1. the footing of the front platform wall; 2. the platform wall; 3. the floor or "platter" and stub wall; 4. the barrel, end walls and the barricade wall, when attached to the magazine, poured as a monolith. There are 195 cubic yards in the "platter", 90 cubic yards in the barrel and end walls, and 35 cubic yards in the wing and barricade walls. The forms and ties for the barrel are designed for a concreting rate of from 30 to 40 cubic yards an hour which has been maintained throughout all the work.

Both internal and external vibration is used during the pouring of the concrete which is delivered by truck mixers, dumped into 1¼-yard bottom-dump buckets or 1½ to 2-yard lay-down buckets swung by cranes with 80-foot booms up to the eight plywood pouring pockets. At one of the magazines, when we visited the project, a Lorain crane was swinging one of the 1¼-yard Fitzgerald & Hudson concrete buckets which has poured over 70,000 cubic yards of concrete.

To permit easy stripping of the inside form of the end wall of the magazine, a bevel filler strip is set at the bottom of the form and is removed first so that the panel will drop and thus come out easily. The inside forms of the barrel are removed by taking out one truss near the end, removing the panel, and proceeding right down the line.

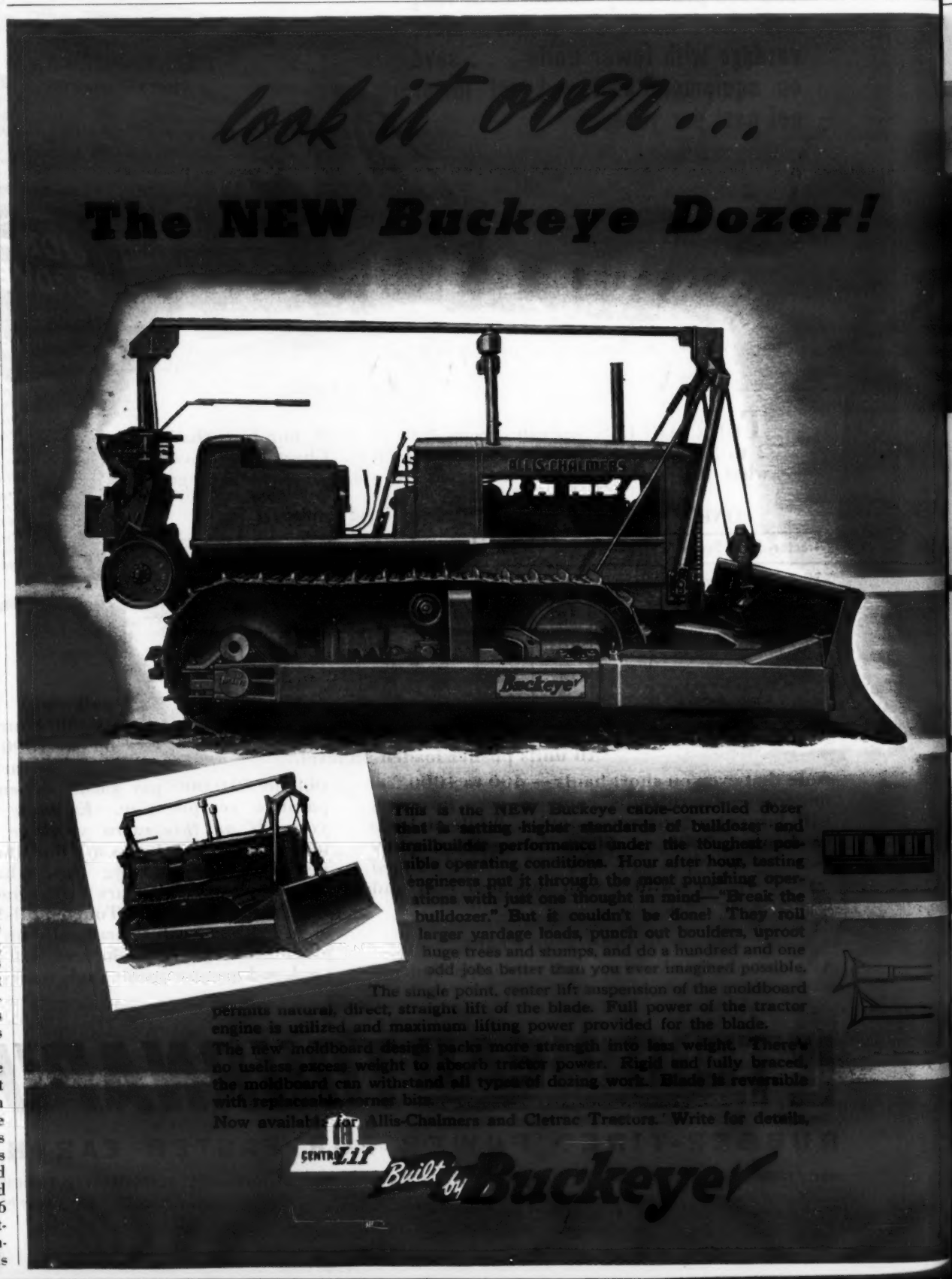
Personnel

This large group of concrete-barrel magazines at a Navy Ammunition Depot "somewhere in eastern United States" is being built for the United States Navy by Corbetta Construction Co. of New York City, with Fred Foss as Project Manager, E. W. Stearns, Alternate Project Manager, and C. H. Davidson, Division Manager. The work is under the direction of the Bureau of Yards and Docks, Navy Department, Washington, D. C., of which Vice Admiral Ben Moreell, (CEC) USN, is Chief. Commander D. E. Rockwell, (CEC) USNR, is Officer in Charge of Construction.

New Caterpillar Catalog

A new 20-page booklet covering the complete Caterpillar line of diesel engines, tractors and road machinery has just been made available for distribution. A wide variety of earth-moving and road maintenance and construction operations are shown in the photographs, including one of a tractor and scraper grading a county road, scrapers engaged in earth-moving on a military-training-camp road, pipe-laying with a D7 tractor, and a Caterpillar diesel motor grader at work on a logging road in California.

Free copies of this interesting and informative booklet, Form D-41, may be secured by writing to the manufacturer at Peoria, Ill., and mentioning this item.



Good Post-War Roads Can Cut Motor Costs

An adequate post-war highway program will bring cash benefits in the form of reduced car-maintenance costs, more miles per gallon of gasoline, longer vehicle life, and fewer accidents, according to a bulletin recently issued by Charles M. Upham, Engineer-Director of the American Road Builders' Association.

It is estimated that prior to the war, about $17,500,000,000 a year was the total sum spent in operating all cars, buses and trucks, and maintaining and constructing roads, but the latter item accounted for a very small portion of the total money spent, less than $2,500,000,000. In other words, for every seven dollars paid out by the motorist, only one dollar went into road upkeep and construction, and the other six dollars went into direct car costs. Correction of this disproportion will mean reduction in the cost of motor travel, less wear and tear requiring costly repairs, and at the same time will provide the employment necessary for the immediate post-war era.

Supporting this line of reasoning, tests made in Iowa over 260,000 miles of operation established the following facts: gasoline costs on gravel roads were 10 per cent higher than on high-type pavement; the cost of lubricating oil was 40 per cent higher; and car-repairing costs were three times higher. Although no tests were made on deteriorated, overage pavements, it is obvious that they exact huge tolls.

Even before the war, many people felt that highway and street construction lagged behind actual needs, and wartime conditions have brought it practically to a standstill. "To make up for lost time and to meet even the minimum post-war needs", Mr. Upham states, "we are going to have to greatly step up highway construction. Plans being made by industry and business for future well-being will have one certain result—an immediate and continued increase in highway traffic. Unless a bold attack is made on inadequate highways and streets, plans for converting to peacetime business activity will be seriously hampered, if not defeated." He concludes by urging that the Federal, state, city and county governments make definite highway programming and financing plans now in order to eliminate any possible need for relief work after the war, and to realize the direct benefits of highway improvement in reduced motoring costs.

Pooler Named to Head Production of Carey Mfg.

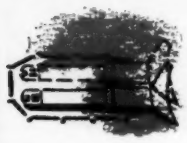
The appointment of C. B. Pooler as Vice President in Charge of Manufacturing has been announced by the Philip Carey Mfg. Co., Cincinnati, Ohio. Mr. Pooler, a native of Fort Dodge, Iowa, is an electrical and mechanical engineer with many years of experience in the building material industry, and has served in various capacities in plants producing fabricated steel, metal lath, insulating board, roofing, paints, paper, asbestos and gypsum products.

these features mean EXTRA PROFITS

...even on your toughest jobs!

Center Lift, single point suspension — Blade is raised in natural, direct way assuring maximum lifting power. Wear and friction losses are minimized. Design and construction of the new model are simplified. Full power of tractor engine is utilized.

Blade easily angled — With new push arm and horn construction, trailbuilder blade can easily be adjusted to right or left on a single king pin to standard desired angles by removing the two landside pins which hold the blade rigidly in place when angled or straight.



Double Trunnion Tilting — Double trunnion mounting permits either end of trailbuilder or bulldozer blade to be tilted 12" by attaching one push arm to the top trunnion on one side while the opposite arm is attached to the lower trunnion on the other side.

Bigger yardage loads — Scientific blade curvature rolls the load ahead enabling the operator to take deeper cuts — no dead weight — less power required — bigger payloads — moves faster — less strain on tractor — blade digs its own way in like a plow.

Finger-Tip, Split-Second, Fraction-of-an-inch Control — Buckeye Power Control Unit takes hold of the line with a smooth, powerful pull, without any jerking action. Large clutches and brakes, plus external location, mean cool operation and long life.

Balanced Design — Full length of crawlers stay on the ground — no lost traction — maximum pushing power assured — mechanical downward pressure not required. Weight is distributed uniformly over each of the crawler shoes on the ground. Blade hugs radiator.

BUCKEYE TRACTION DITCHER CO.

Findlay, Ohio

The New Highway Bill Is Before the House

Proposed Appropriation Reduced to $500,000,000 Annually; Bill Held To Be Inadequate for Road Needs

✦ REACHING a compromise on many controversial provisions, the House Roads Committee has reported favorably on H. R. 4915, which was offered as a substitute for H. R. 2426, the new Federal-Aid appropriations bill. As it now stands, the bill provides for a total three-year post-war highway program amounting to $1,500,000,000, to be apportioned among the states in accordance with the Federal Highway Act of 1921, except that the basis of apportionment will be one-half on population, one-quarter on area, and one-quarter on post-road mileage. The proposed matching basis for the first year is 60 per cent Federal funds and 40 per cent state funds, with the regular 50-50 matching basis applying thereafter. Special provision is made for states with large areas of publicly-owned land.

The measure provides that the Commissioner of Public Roads may advance funds to the states where necessary to expedite construction, and may also authorize the allotment of funds for surveys and plans and for right-of-way acquisition, as well as for post-war construction.

Believing that the original name selected for the Interregional Highway System was not properly descriptive, the new bill designates the network as the National System of Interstate Highways, not to exceed 40,000 miles in total extent, and so located as to connect by routes as direct as practicable the principal metropolitan areas, cities and industrial areas, to serve the national defense and to connect any suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico. Selection of the routes in this system is left to the state highway departments, in accordance with the regular provisions of the Federal-Aid statutes, but routes selected for this system automatically become part of the Federal-Aid highway system if not already so designated. However, no separate funds are authorized by the bill for the selected network.

The funds provided in this bill would be allotted on an annual basis as follows; Federal-Aid system, $225,000,000; secondary and feeder roads, $125,000,000; urban highways, $150,000,000; forest highways, $25,000,000; forest development roads, $12,500,000; parks and monuments, $4,250,000; and parkways $5,000,000; making an annual total of $546,750,000.

Under the terms of the new bill, funds for the first post-war year would be apportioned thirty days after the passage of the act, while funds for the second and third years would not be apportioned until after the war. This would mean that not more than one-third of the total program could reach the commitment stage until after the war, which would limit contract agreements for Federal-Aid highways, farm-to-market roads, and urban streets to a total of $500,000,000.

In reporting out the bill, the House Roads Committee issued a comprehensive statement which emphasized the urgency of Congress acting without delay. National policy must be clearly established, the report said, so that states can make "full progress in meeting the complex legal, financial and engineering problems which must be solved in advance if the post-war program is to be soundly planned," for nearly all of the state legislatures meet in biennial session in 1945.

(Concluded on page 36)

Construction by Contract; Basic Facts You Can Use

Project Committee of the Highway Research Board Presents Data Contractors Need to Fight Day Labor

✦ SINCE many administrators of public works still feel that governmental projects can be built more cheaply and better by day labor than by contract, there is a big present job for individual contractors and their local and national organizations to continue their activities in showing the axiomatic self-evident economies of "Construction by Contract". The Project Committee on Post-War Planning of the Highway Research Board presented a paper by Carlton N. Conner, Public Roads Administration, at the November, 1943, meeting. The facts therein are so useful in the current education program of progressive contractor organizations that we are publishing portions of the paper in advance of its appearance in the *Proceedings* of the Board.

The Committee report relates principally to highway construction and was intended to define the contract and day-labor systems, to evaluate the advantages and disadvantages of each, and to present conclusions and suggestions that will serve as a ready reference and guide for those considering economic problems of the post-war program.

Day-Labor Method

Day-labor construction is a procedure whereby a public agency itself undertakes the work with employees hired for the purpose. In this connection the terms day labor and force account may not be used synonymously although common usage makes no distinction between them. Force account is the term used under a contract to designate extra work done by the contractor for which no price was bid in the contract; whereas day labor is the term applied to construction that is accomplished by the owner with his own organization.

Field of Use of Day Labor

Advocates of day-labor procedure claim that it saves the contractor's profit, that it readily permits changes in original design or scope of project without cumbersome negotiation, and that it enables the owner to maintain direct control of every feature of the operation at all times.

However, day labor has several proved weaknesses which for the most part have limited its application to exceptional situations. In the first place, it is highly vulnerable to political manipulation. In the second place, no certain means are provided whereby ultimate cost of the completed structure can be fixed in advance. In the third place, a construction organization recruited for day-labor work usually lacks the background of teamwork, experience and driving accomplishment which speedy and economical construction require. By whatever means the job is operated, someone must run it, supply the equipment, handle purchasing and accounting details, and coordinate the various operations. Here, as in all business, the most compelling achievement motive is that which promises possible profits and at the same time presents the grim alternative of financial failure. Here, indeed, competent leadership and supervision are essential.

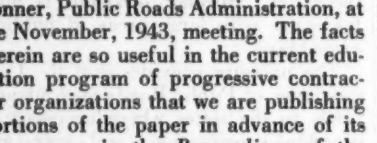
On a day-labor project using public funds no such incentive and compulsion are present and those possessing the desirable qualifications to supervise the work are usually employed elsewhere.

Opponents of the method point out that WPA resorted to day labor, not as an economy measure, not as a means of securing better or quicker construction, but in order to utilize the greatest possible total of man-hours per unit of work performed. Money and man-power were available in vast quantity; work projects were the limiting factor.

The day-labor method may be used to advantage on public works where much employment must be given quickly and costs may not be an important factor. The day-labor method may be used on new or unusual types of construction, on projects of unprecedented size, experimental undertakings or projects for which a schedule of work items cannot be set up. A number of major projects have been constructed by day labor after bids were received and rejected, including the Panama Canal, the Miami Conservancy District, and certain locks and dams along the Ohio River.

Reasons advanced to justify day labor on highway work are better employment of common labor, supervisors and equipment operators living in the vicinity of the project; better use of local materials; and a saving in construction costs. It is believed by some that day-labor construction can be carried on at a cost equal to that for contract construction, provided projects adaptable to day labor are selected and competent supervision is employed. Types of highway work adapted to day-labor methods include clearing right-of-way, clearing ditches and culverts, improving shoulders, removal of obstructions to improve sight distance, widening curves, improvement of slopes, minor drainage construction, and resurfacing secondary roads.

(*Continued on page* 30)



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Your turn is coming when Jaeger will supply you with the smoothest running 2-stage, air-cooled compressors you've ever operated . . . . Built to aircraft engine precision standards in a balanced "W" design, with "Tough Swedish Twin" Valves for air plus coolness, full force-feed lubrication and large reserves of power, they are efficient in performance, accessible and long-lived in every part . . . Please be patient until Uncle Sam's needs have been supplied . . . THE JAEGER MACHINE COMPANY, Columbus 16, Ohio.

"FLEET-FOOT" Crane-Loaders

"SPEEDLINE" Concrete Mixers

"SURE PRIME" Contractors Pumps

JAEGER *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

U. S. Army Signal Corps Photo

Bridging a fast-flowing New Guinea river. Here Army Engineers are constructing and aligning the main support for a permanent wood and concrete structure. The pier form has been completed, and steel cables attached. Tractors on the shore were used to align the form, after which it was filled with concrete.

Secretary of AED Speaks in Canada

The points of agreement and difference in the procedure for the disposal of surplus construction equipment in the United States and in Canada at the war's end were discussed by C. F. Winchester, Executive Secretary, Associated Equipment Distributors, at the first annual meeting of the Associated Equipment Distributors of Canada at Montebello, Canada.

Mr. Winchester pointed out that the disposal of surplus equipment is a major problem, and that the AED resolution on this subject, prepared at the annual meeting of the AED and approved by the Executive Committee, has been delivered to congressional leaders and to other associations interested in the topic.

This resolution, as originally presented, made a plea for the sale of all surplus equipment through established equipment distributors in order to maintain uniform prices which would bring a fair return to the taxpayers, to control the rate of distribution of the equipment so as not to disturb the market, to eliminate speculators, distribute the surplus through established trade channels, and give small business a chance. Recently this resolution was amended by the Association's Committee on Disposal of Government Surplus Equipment, stressing that new and used machines should first be offered to other Federal agencies having need for them, and second, that the surpluses then remaining be sold, *not given*, to non-Federal tax-supported bodies, the balance thereafter to be sold through established trade channels. The Committee has further clarified the first two points of the resolution in that transfer to Federal agencies or sale to tax-supported bodies should be *for maintenance purposes only*. The AED has expressed itself as definitely opposed to a recurrence of "alphabet" agencies designed to do work by government forces and machinery, as it strongly believes that the best interests of the nation are served when construction is done by contract.

In the Dominion of Canada, there is a Crown corporation set up to handle the disposal of surplus equipment, while in the United States there is the Surplus War Property Administration.

"William L. Clayton, Surplus War Property Administrator in the United States, has seen our resolution", Mr. Winchester said, "and says he sees no serious objection to it, except that there will be times when such equipment will have to be sold by a negotiated sale and there will be other times when it would be disposed of through other than established trade channels."

Mr. Winchester also spoke of the importance of the rehabilitation of former employees of the construction equipment industry who now are in the armed forces. He pointed out that they would bring back a "wealth of knowledge" from their service, and that their knowledge of how such equipment functioned under all conditions in the various theaters of war would prove invaluable.

The meeting was presided over by James F. Crothers of George W. Crothers, Ltd., Toronto, President of the Canadian group. George E. I. May, General Supply Co., Ltd., is Honorary Secretary-Treasurer. The parent organization in the United States was officially represented by H. O. Penn of New York City, Executive Vice President of the AED.

Although the Canadian AED is just a year old, already 80 per cent of Canadian distributors have become members, making a total of thirty-one active, four associate and four allied members.

Cement-Handling Units Featured in Bulletin

Complete bulk cement plants and cement-handling equipment are described in a new bulletin just issued by the C. S. Johnson Co., Champaign, Ill., featuring Johnson cement chargers, Dutchmill plants, bins and silos. These units are available in sizes to fit any on-the-job requirement and, it is stated, several of them are so designed that they can be purchased in small units, then enlarged economically as needs expand.

Interested contractors and engineers may secure copies of this informative bulletin by writing to the manufacturer.

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

Gnawing on a hillside

...means continual load variation on the Diesel power-unit

● Whether the shovel chips and bucks its way along in loosening tough, rocky earth—or swings rhythmically through load and drift in "easy going"—the Pierce Governor keeps the speed constant, the power efficiently controlled to the need.

For the operator, it is better than a human hand at the throttle control. Pierce Flyball Governors compensate instantly for every change in load. Action is mechanically positive—dependable through maximum trouble-free service life. There is no gumming or sticking.

This is but one example of Pierce Governor's many applications. Grading, rolling, excavating, hoisting, compressing, transporting—everywhere that internal combustion engines provide power—and need governing—Pierce Governors are on the job. Specify Pierce on the new equipment you buy—and if your present equipment is not Pierce governed, write for the new Pierce Catalog just off the press.

THE PIERCE GOVERNOR COMPANY, INC. • 1615 OHIO AVENUE • ANDERSON, INDIANA

Manufacturers of Pierce Precision Governors and Sisson Automatic Chokes

Canadian Manufacturer and Distributor: BURLEC LIMITED, Toronto 13, Canada

PIERCE GOVERNORS

Painting Stripes On Main Highways

Man-Power Shortage Has Cut Number of Power Machines From Three To One To Cover Entire State of Georgia

✦ THE painting of center stripes on Georgia highways by power-operated machines began in 1940 when three White single-stripe units were purchased. The use of the yellow caution stripe on one or both sides of the center black or white stripe to indicate no-passing zones necessitated some changes in the machines, and the addition of Prismo beads to the yellow stripe required still further changes.

The Present Striper

The machine as now operated, with the extension built onto the original machine by the state, is 40 feet long. The motive power for the machine is a GMC truck with an extended chassis. At the extreme front is a very small air storage tank which is to be replaced by a larger one to permit more effective operation of the striper when all three spraying units are being used. Immediately in back of the air tank, and located beneath the front hood, is a 100-gallon tank running longitudinally in which the yellow paint is stored, with a pipe leading from it back to the application unit. Next is the cab in which the driver sits, sighting the painted guide spots on the road from his seat directly behind the wheel, using a triangular sight mounted on the front bumper of the striper.

Immediately back of the cab is a 165-gallon tank mounted transversely which is used to carry the white paint for the center stripe on black-top roads. Behind this is a 75-gallon tank mounted vertically in which the black paint for application on concrete roads is carried. A 1-cylinder DeVilbiss gas-engine-driven air compressor is mounted behind the last tank and beneath a rectangular tank built by the Georgia Highway Shop for carrying 1,200 pounds of Prismo beads which are used to make the yellow stripes luminous at night under the headlights of motor vehicles.

The three controls for applying paint to the road surface through the three nozzles between sleds, and the three valves controlling the air pressure to the paint tanks, are mounted on the back of the rectangular tank carrying the beads. A cushioned seat is provided for the paint-spray operator and there is a hole cut in the metal platform on which his feet rest so that he can see the operation of the sprays and the road 6 feet below. A pushbutton on the operator's platform enables him to communicate with the driver by pre-arranged signals. If the vehicle is standing still and he blows the horn, it means that he is ready to start; and if the vehicle is moving, a similar signal means to stop.

A feature of this machine is the addition of the two extra spray units so that three 4-inch stripes can be painted at one time. The original sleds or side barriers to confine the application of the paint to the 4-inch stripes dragged on the ground and wore rapidly. To overcome this, particularly as two more pairs of sleds added to the weight of the spraying device, the entire spraying unit is now mounted on a carriage with three small rubber tires. When painting begins this is let down to the road by means of a lever at the back of the machine and then is raised when the machine is merely traveling. The entire center-striping outfit is mounted on dual pneumatic tires at the rear and single pneumatic tires for the front steering wheels.

Operation and Production

In order to assure efficient operation of the motorized center striper, it is accompanied by a 1½-ton Chevrolet flat-body truck which carries twelve drums of paint. A hand-operated crank-

(*Concluded on page 62*)

The Ohio Locomotive Crane Company USES A Climax R6I ENGINE TO POWER THIS OHIO CRANE

This Climax R6I, used on the crane below, is a 6 cylinder, valve-in-head engine which develops 180 h.p. at 1200 r.p.m. and burns natural gas, manufactured gas, butane or gasoline.

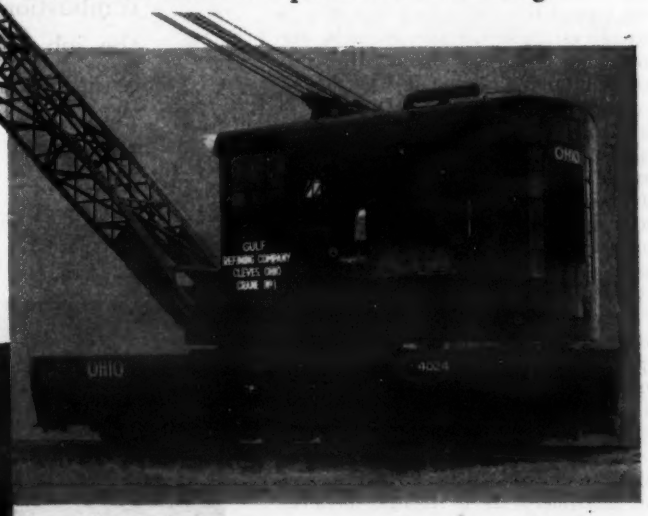
Here is the power plant for YOUR crane, shovel, dragline snow-plow, pump or other equipment.

For stationary or mobile drives; belt, chain or direct-connected, the Climax R6I gives you 166 h. p. at 1200 r. p. m.

The Climax R6I Blue Streak Combustion Chamber gives unusually high horsepower output on little fuel. This chamber causes complete gas mixing and more efficient scavenging, which steps up power delivery and reduces detonation and power losses when the engine operates under sudden or periodic overloads.

Cool running is assured by the deep, widely-spaced water passages which surround the cylinder heads and full length of stroke. Operation is possible over a wide speed range without encountering criticals. The low piston speeds and compression ratios guarantee minimum upkeep cost and long engine life.

Climax R6I maintenance is inexpensive and easy, and can be done by any local mechanic. The overhead valves make grinding simple, and there are no extremely close tolerances to be made. The cylinders are cast with walls of sufficient thickness to permit several reborings.



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CLIMAX ENGINES are 4, 6, 8 and 12 cylinder gas engines with ratings from 40 to 495 h.p. Climax Diesel engines are made in two models rated at 22 and 44 h.p. The gas engines operate on natural gas, butane, or gasoline. The Diesels use standard grade fuel oil.

WRITE FOR INFORMATION—to Climax Engineering Company, 1811 South Fourth St., Clinton, Iowa.

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ROGERS TRAILERS have played a big part in fortifying our coastlines and they are fighting with our men overseas!

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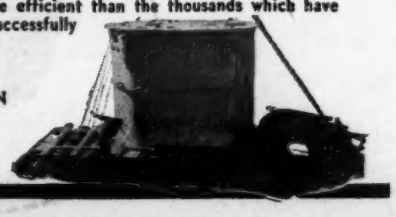
The ROGERS TRAILERS which will be available to industry when present war contracts are completed, will be even better-engineered and more efficient than the thousands which have been operated so successfully for many years.



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EXPERIENCE builds 'em PERFORMANCE sells 'em

Bureau of Reclamation Photo
The core wall at Shasta Dam in California, showing reinforcing in place, and the inspection tunnel in the spread foundation of the wall.

Earth and Rock Fill For Shasta Core Wall

(*Continued from page* 1)

ture.

Only three bucketfuls were loaded into the 25-cubic-yard dump bodies of the White trucks because of the difficult ¾-mile haul over a road which wound around steep curves and over a 220-foot rise. We were somewhat disconcerted during an inspection trip over this haul road by having the chauffeur pass an oncoming heavily loaded truck on the wrong side but were reassured by the information that this was standard practice, understood by all drivers, to enable the loaded trucks to stay on the inside of some sidehill sections of the haul road. Five trucks were used on the haul and averaged 20 loads each per 8-hour shift.

Dumped material was spread in 9-inch loose layers, which were compacted to the specified 6 inches by a Caterpillar D8 tractor with a LeTourneau bulldozer in front and a job-built attachment known on the job as the "cowdozer" on the back. This was a blade 30 inches wide and 10 feet long with its concave side toward the tractor, dropped by gravity and raised by cable from the regular power take-off on the tractor. Its use proved advantageous in many cramped locations for pulling excess material away from the wall.

The desired 17½ per cent moisture content, when not naturally present, was obtained by sprinkling the material in the stockpile before loading. Two sheepsfoot rollers loaded with sand and water to 30-tons weight were pulled by Caterpillar D8 tractors in the compacting operation. By making twelve complete passes oyer each 9-inch loose layer the material was compacted to a weight of 103 pounds per cubic foot, 1 pound more than it weighed in its original undisturbed position.

In separating the two classes of rock fill, one with a 6-inch maximum size and the other with an allowance of boulders of 1 cubic yard, a bulldozer with rake teeth spaced with 7-inch clearance and extending 18 inches below the bottom of the blade was used to separate the sizes after they had been hauled and dumped together.

An 18-inch strip of earth fill adjacent to the core wall was compacted by four Ingersoll-Rand pneumatic tampers with 6-inch-diameter faces and driven by air from a 2-inch hose connected to the pipe system from the central compressor station which supplied air to all operations at the dam site.

All three classes of fill were raised more or less together with light lifts of earth fill placed slightly in advance, and the two kinds of rock brought up simultaneously. Filling operations were so coordinated as to keep the work at the same elevation on both sides of the core wall and within 2 to 20 feet of the core wall's top elevation as it was poured in 10-foot vertical lifts.

Personnel

This operation was not a separate contract but was included in the major contract for the construction of Shasta Dam awarded to Pacific Constructors, Inc. F. T. Crowe was General Superintendent, Frank Bryant, General Foreman, and W. V. Greeley, Chief Engineer.

For the Bureau of Reclamation, the work was under the supervision of Ralph Lowry, Construction Engineer, Kennett Division, assisted by J. R. Granger, Chief Inspector, C. S. Rippon, Chief Inspector of Concrete Structures, and a corps of assistants.

Bureau of Reclamation Photo
The left core wall at Shasta Dam, as seen from the road at crest elevation.

New Marion Distributor

Distribution of its products in the eastern half of the state of Washington will be handled by the Star Machinery Co., Seattle, Wash., according to a recent announcement by the Marion Steam Shovel Co., maker of excavation equipment, Marion, Ohio. Complete sales and service facilities will be available, and the Star Construction Equipment Division, under the direction of Jack T. Hatten, will carry an adequate parts stock to service Marion machines already in the field. The new dealer will operate in close cooperation with Joe Reed, Marion District Representative, with headquarters in Portland, Ore.

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A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

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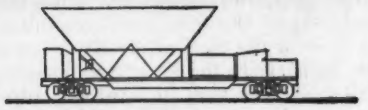

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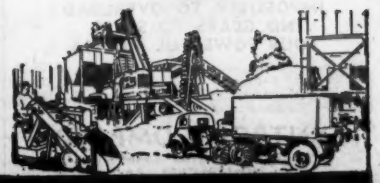
Equipment which can be readily moved from job to job without expensive disassembly is so desirable a feature that many contractors are willing to sacrifice capacity and convenience in order to obtain it. But here is a *full-size*, high capacity plant ready to move at a moment's notice, ready to go to work in a new location at a surprisingly short time. With 125 tons of bin storage, this plant batched three aggregates *and cement* to truck mixers at 120 cubic yards per hour consistently—a speed limited only by the capacity of the crane.

Butler ready mixed concrete plants, like all Butler equipment, is designed for your needs; let them serve you as they are serving builders around the world. Write today for Bulletin B-185.



BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

Bureau of Reclamation Photo
A crowd lines the stilling basin at Friant Dam in California to watch the first water flow into Madera Canal.

Madera Canal in California Now In Irrigation Service

A brief ceremony on the afternoon of June 4 marked the release of the first water for irrigation from Millerton Lake, formed by Friant Dam in California, into the Madera Canal. Charles E. Carey, Regional Director of the Bureau of Reclamation, made a short speech, to which Judge Harold V. Eastman, speaking for the residents of the area to be served by the Madera Canal, responded, and then J. A. Secara, President of the Madera Irrigation District Board of Directors, opened the 84-inch needle valve (See C. & E. M., June, 1944, page 37), releasing the first flow of water into the Canal.

In connection with the occasion, Mr. Carey pointed out that the Central Valley Project, of which Friant Dam and the Madera Canal are a part, has been in operation longer than is generally realized. The delivery of domestic and industrial water from the Contra Costa Canal began in August, 1940, and irrigation deliveries started the following year. Shasta Dam has been controlling the flow of the Sacramento River since last January. In the lower San Joaquin Valley, 30,000 acres of war-food crops were saved in March when water was released from Millerton Lake to offset unseasonable drought conditions.

About 25 miles of the Madera Canal will now be in operation, while construction continues on the remaining portion.

Motor-Grader Demand Exceeds Civilian Supply

State, county and township highway departments account for the largest part of the civilian demand for motor graders, according to information from the War Production Board, which reports that these requirements and production problems were reviewed at a recent meeting of the Motor Grader Manufacturers Industry Advisory Committee. Such demand for this type of equipment, it is stated, exceeds the supply, despite the fact that more motor graders have been released for governmental uses than for other civilian purposes. To meet this situation, WPB Governmental Division officials have suggested that the governmental requirements for tractors be reduced, since the demand has decreased, and that the grader production program be stepped up proportionately.

The War Production Board further states that the supply situation for controlled materials has improved in general, although there is still a shortage in some sizes of copper. It was recommended to manufacturers that they use aluminum wherever practicable, since reasonable quantities of aluminum castings can be supplied.

New Chain Belt Catalog

A new catalog describing and illustrating Rex Z-Metal chain belts has just been issued by the Chain Belt Co. Rex Z-Metal is a ductile ferrous cast metal with a high tensile strength, said to be exceptionally desirable for cast chain belts because of its toughness and its resistance to corrosion. Some of the uses suggested for chain belts of this material are sand and gravel plants, and cement mills.

Copies of Bulletin 437, which contains photographs of these belts in operation, as well as photographs of details of the belt construction, may be obtained upon request to the Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis., and mention of this review.

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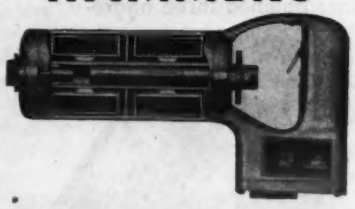

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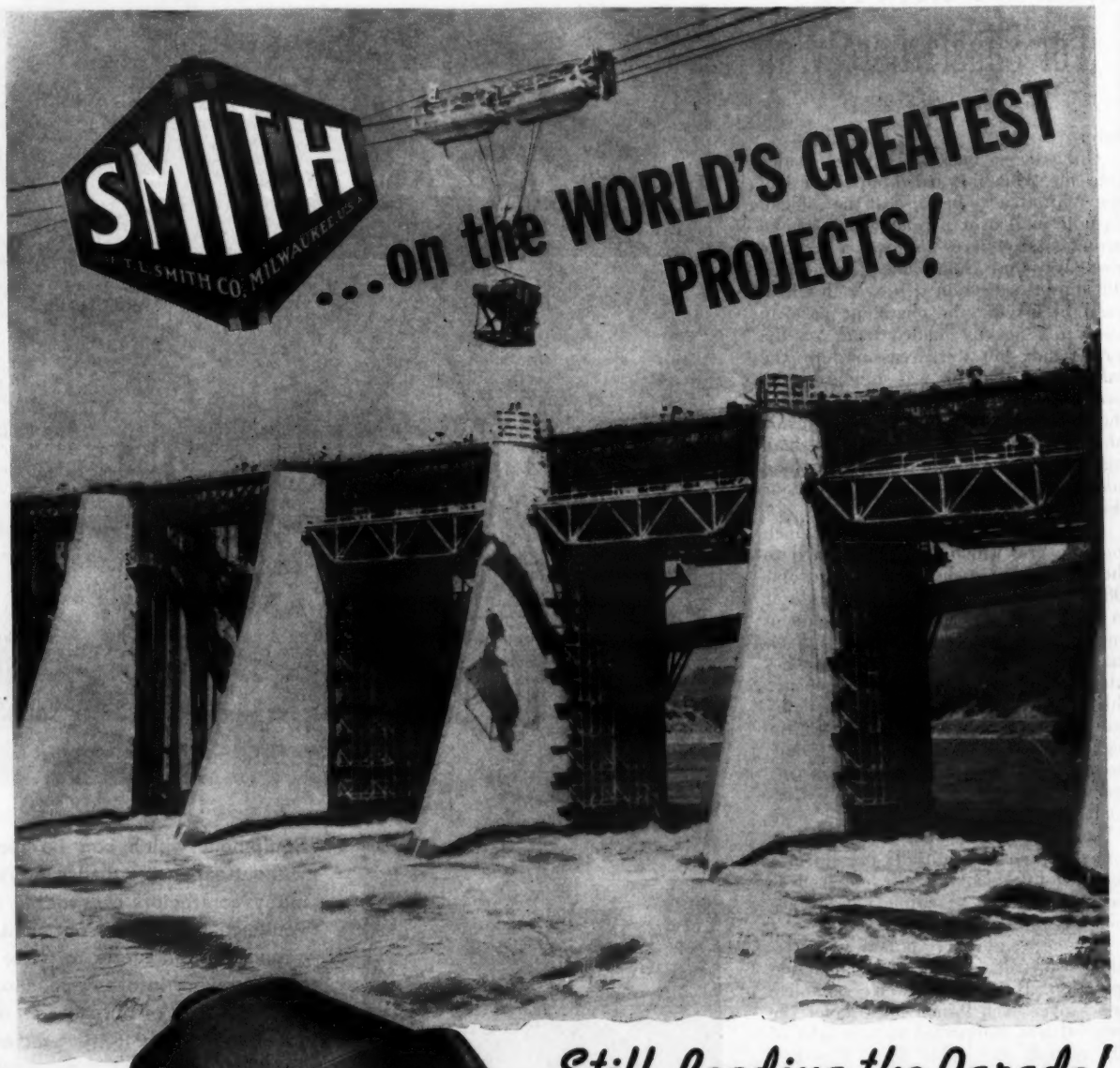

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A 4309-1P

Large Sewer Project Built Because of War

Bridgeport, Conn., Completing Program Started 10 Years Ago, Need Accentuated By War Growth of Population

✦ NUISANCE and health hazards caused by the settling of raw sewage in creek and river beds and along the beaches of Long Island Sound at Bridgeport, Conn., started a sewer construction program at the inception of its oft-elected Mayor, Jasper McLevy. Through CWA, FERA, WPA, and FWA, sewer construction progressed to a total volume of approximately $6,000,000, including Federal and local funds. When the World War started in 1939, Bridgeport, always an active manufacturing center, leaped forward in population, and new FHA and war housing projects were completed, greatly over-loading the existing sewers.

Worse than overtaxed sewers was the discharge of raw sewage through many outlets into the waterways which divide the city. Pequonnock River, Yellow Mill Pond, Johnson's Creek, and Cedar Creek cut deep into the industrial sections. The banks of these streams were covered with unsightly and odorous organic matter at low tide and new residents endangered their health by digging clams in the polluted mud flats. In addition, the shores of Long Island Sound offer tempting bathing in salt water to war workers whose B cards won't permit more distant driving.

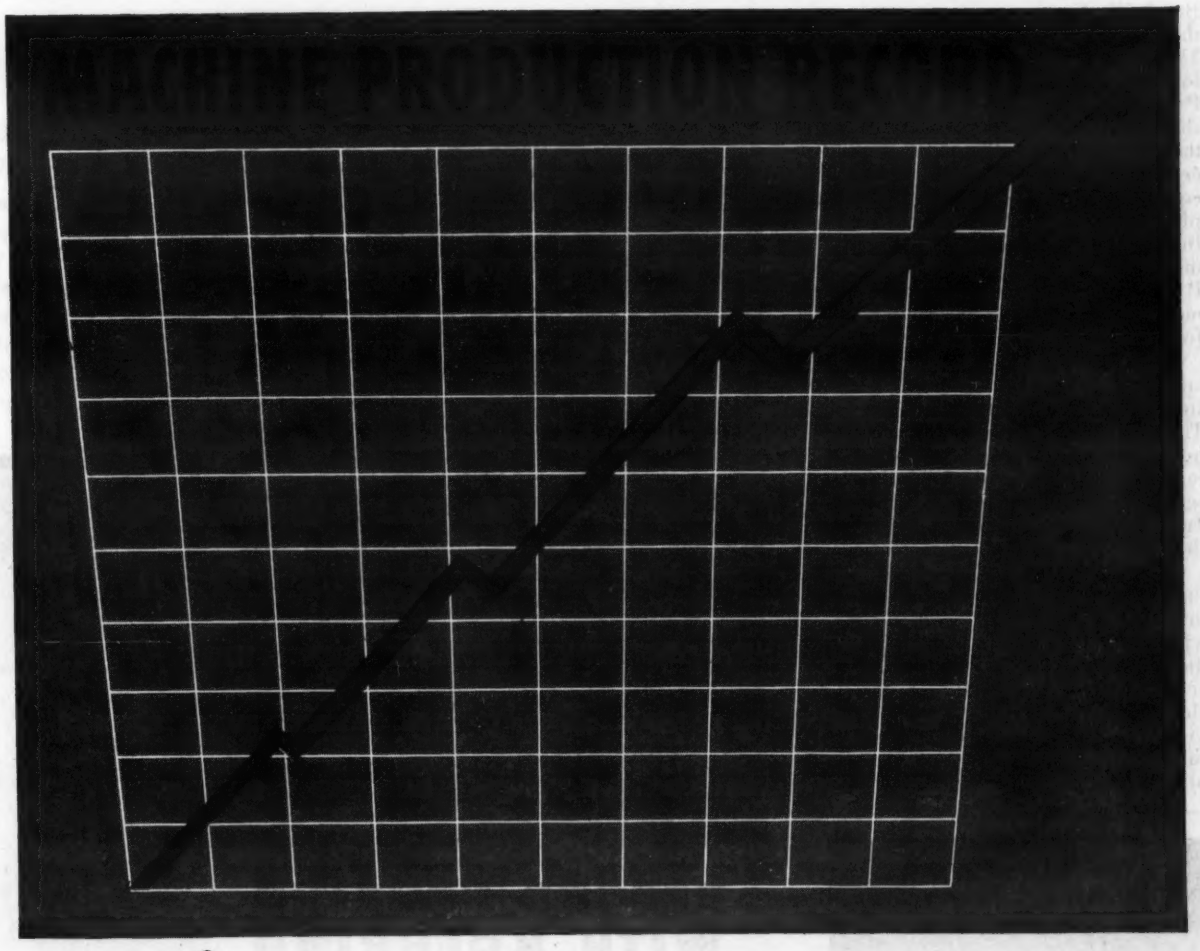
All of these combined to force the large sewer program upon Bridgeport as a wartime construction project of paramount importance. Exclusive of the two sewage treatment plants which are yet to be started, to cost $2,000,000, the current war program is costing $1,382,732 which is one of the largest sewer construction projects in the country today and the largest in New England. Federal funds to the amount of $732,000, requested under the Lanham Act on July 3, 1941, are included.

The 1940 Federal census placed the population of Bridgeport at 147,747, of which 35,000 worked in the factories of the city. Today there are 225,000 people with 95,000 war workers. Public and private housing has kept pace with this growth, concentrating domestic sewage in definite areas, and the great volume of industrial waste has multiplied tremendously. The normal flow of sewage west of the Pequonnock River, which was from 8 to 15 mgd, has increased to 70 mgd. The Congress Street treatment plant could handle but 5 mgd of the flow and the balance has been flowing through eight raw-sewage outlets into the Pequonnock River. The housing projects are scattered over every section of the city. Federal funds have built ten projects comprising 4,415 units, FHA funds have aided in the construction of six projects accounting for 2,996 units, and private development over a period of four years has added 5,000 units.

The city has had the utmost cooperation from the Federal government and the U. S. Public Health Service in furthering this war public works program to protect the health of war workers. After the trunk storm and sanitary sewer program is complete, it is expected that the East Side Plant at Seaview Avenue will be built, at a cost of $1,200,000, on a site already acquired for $68,000. In addition, the Bostwick Avenue pumping station on the west side, which is 25 years old, will be rebuilt and $800,000 expended for a primary treatment plant. Only after this treatment program is complete will the waters of the streams flowing through the city and the bathing beaches become fit for recreational purposes and make it possible to clean up the inner harbor of all organic matter detrimental to public health.

(*Continued on page* 64)

A scene during the construction of the Johnson's Creek interceptor, Contract III, on the Bridgeport, Conn., sewer project.



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Write for Bulletin 161

LISTER-BLACKSTONE, Inc.

1706 So. 68th Street MILWAUKEE, WIS.

Asphalt Plant Set-Up For Paving at Airfield

(*Continued from page* 1)

planes miring in the subgrade adjacent to the narrow taxiways.

The stabilization of the subgrade for the widening of the taxiways was done in the same manner as at an adjacent field for a 10,000-foot instrument runway, and the placing of the compacted Ocala lime-rock base was also done in the same manner as for the runway. (See C. & E. M., April, 1944, page 1.) The base was primed with 0.12 gallon of RT-2 tar per square yard which was allowed to cure before the hot-mix binder and wearing courses of 1½ inches each were laid.

The Asphalt Plant

The contractor set up his asphalt plant adjacent to a railroad spur on which the cars of Birmingham slag and crushed Brookville limestone were spotted and then unloaded. A Marion crane with a 1¼-yard Haiss clamshell bucket unloaded the cars to the stockpiles while a P & H crane with a ¾-yard Erie clamshell fed the slag and fine aggregate to the hoppers of the calibrated chain feeder which delivered the aggregates to the cold elevator of the Cedarapids asphalt plant. An International TD-14 with a Bucyrus-Erie bulldozer was used to feed the aggregates from the stockpile to the P & H crane so that it did not have to be moved from the most efficient position for rapid feeding of the plant.

The plant drier was 5 feet in diameter and 28 feet long, equipped with a Gem fuel-oil torch with steam atomization. The dried materials went direct to the hot elevator of the asphalt plant, at the top of which the double-deck vibrating screens separated the slag and sand into the required sizes for the two bins above the weighing batchers.

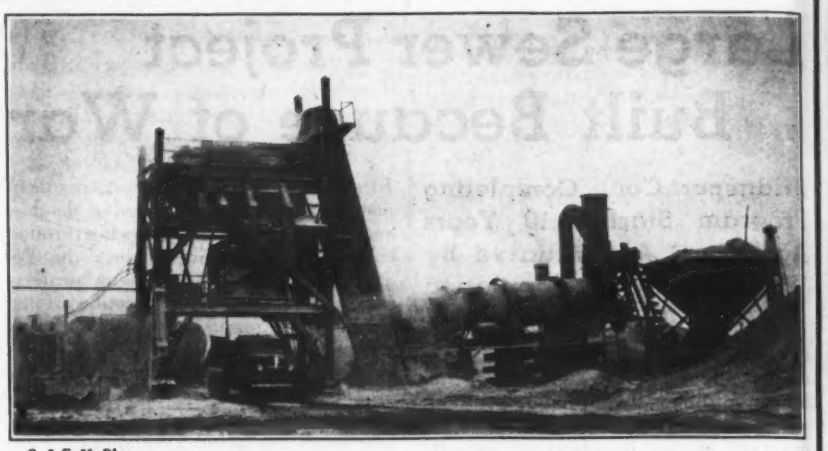
Due to the high moisture content in the aggregate, a double Barber-Greene drier 4 feet in diameter x 20 feet long with a 50-hp gas engine, set parallel to the Cedarapids drier, with a pan feeder and discharging directly into the hot elevator, was added to the set-up in order to dry and heat sufficient material to furnish a capacity supply to the mixing plant which averaged 90 tons an hour.

The separate spur for the asphalt tank cars was equipped for heating three cars at a time while pumping one at a time with a Kinney steam-driven asphalt pump. One 10,000 and a 12,000-gallon asphalt storage tank were provided with heating coils and so connected to the asphalt pump with pressure control on the delivery side as to discharge asphalt to the storage tanks when it was not being taken through the weigh-box line. An 80-hp horizontal steam boiler operating at 125-pounds pressure was used to heat the asphalt tank cars, the storage tanks, operate the asphalt pump, and provide power for opening and closing the mixer gates. A copper-lined vertical wood tank of about 800-gallons capacity was used to hold the make-up water for the boiler. A 3-hp electric motor driving a small compressor supplied forced-air draft for starting the boiler. Fuel oil for the driers was stored in a 12,000-gallon tank and delivered to the burners by a reciprocating pump driven by a ½-hp electric motor.

This Cedarapids asphalt plant handled 3,000-pound batches and was run 12 hours daily, delivering 90 tons of top or of binder per hour. The plant was equipped with two Kron dial scales, one for the two aggregates and the other for the asphalt weigh-box.

To power the plant a D17,000 Caterpillar diesel-electric unit was installed, thus saving the expense and, more im-

(*Concluded on next page*)



C. & E. M. Photo

The electric-driven Cedarapids asphalt plant which delivered 90 tons of either top or binder an hour for paving perimeter taxiways at a southeastern airfield.

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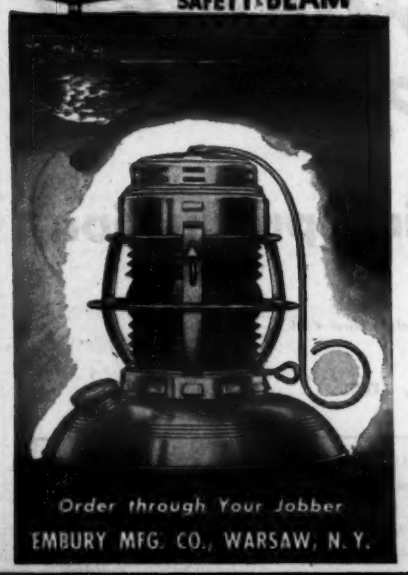

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EMBURY MFG. CO., WARSAW, N. Y.

Army Airfield Taxiways Improved With Hot-Mix

(*Continued from preceding page*)

portant, the time required to install the necessary power lines to the plant site which would have delayed the start of the work. A 30-hp General Electric gear motor powered the drier, another G-E 7½-hp motor drove the hot elevator and a 60-hp G-E motor drove the pugmill while a 5-hp motor of the same make operated the vibrating screen.

The plant was so set up that it was possible to run the batch trucks through under the plant but it was found to be more expedient to allow the crane full play in the area on one side of the plant and to back the trucks under the mixer gates. The plant was operated by the two crane men and one oiler, one laborer in the aggregate cars, one man on the feeder, two weigh men, one fireman, two general laborers, and the Foreman.

Laying the Hot-Mix

A fleet of trucks averaging five, and with a maximum of seven, not quite enough to keep the spreader working continuously, was used to haul the hot-mix from the plant to the taxiways. The trucks were divided about equally between 6 and 7½-ton units, these figures being the loads actually hauled.

The hot-mix was spread in 10-foot lanes by a Barber-Greene tamping-leveling-finisher with a crew of six men and operated at a forward speed of 15 to 18 feet per minute. The finisher was held up frequently because of the insufficient number of trucks and also by delays in reaching the machine due to the continuous use of the field by the tactical unit stationed there. The trucks, even with a wide detour, had to cross at least one runway on every trip between plant and taxiway. The binder and wearing courses, 1½ inches each, were compacted by two 5 to 8-ton Buffalo-Springfield tandem rollers.

Quantities

The major quantities involved in the strengthening and widening of the perimeter taxiways at this field were:

Clearing and grubbing	20 acres
Excavation, regular	41,500 cu. yds.
Borrow, on site	147,500 cu. yds.
Stabilization, lime-rock	32,630 cu. yds.
" processing	323,170 sq. yds.
Base course, Ocala lime-rock	
New taxiways, 8-inch compacted	72,310 sq. yds.
New taxiways, 7-inch compacted	39,860 sq. yds.
Strengthening existing taxiways, 3-inch	12,800 sq. yds.
Strengthening existing taxiways, 2-inch (all compacted)	92,840 sq. yds.
Tar seal, or prime	43,600 gals.
Binder and wearing courses, hot-mix	17,884 tons
Bituminous material for hot-mix	233,110 gals.
Bituminous wearing course, additional	23,740 tons
Bituminous material, additional	381,460 gals.

Personnel

The contract for the extension of the runways was awarded by the U. S. Engineer Department to James H. Craggs Construction Co. as general contractor, and Wm. P. McDonald Corp. was the subcontractor on the asphalt work.

Goodrich Personnel News

The appointment of Felix G. Tanner as Factory Manager at the Cadillac plant, succeeding Robert W. Ransom who has resigned, has been announced by the B. F. Goodrich Co., of Akron, Ohio. Mr. Tanner, a native of Indiana, has been in the rubber business nearly twenty-five years and has been connected with the Goodrich organization since 1932. Until his recent promotion, he served in various departments in the Akron plant.

Six Regional Supervisors for recap plant operations are also announced by Goodrich, as follows: E. F. Cavanaugh, for the districts comprising New York, Albany, Philadelphia and Washington, with headquarters in New York City; Sigmund Uyldert, for Buffalo, Cleveland and Pittsburgh districts, with headquarters in Akron; M. W. Platt, for the districts of Minneapolis, Omaha, Kansas City and Denver, with headquarters in Omaha; C. R. McEntire, for the districts including Charlotte, Atlanta and Jacksonville, headquarters in Atlanta; P. C. Ickes, for the districts of Los Angeles, San Francisco and Seattle, with headquarters in Los Angeles; and L. F. Sonderman, covering the districts of Detroit, Cincinnati, Chicago, Memphis and St. Louis, with headquarters in St. Louis.

Manbee Catalog Describes Wheel-Aligning Equipment

Keeping tires in service through the use of wheel-alignment and balancing equipment is the theme of a new 32-page catalog and supplementary literature available from the Manbee Equipment Co., 406 So. Kolmar Ave., Chicago 24, Ill. The equipment described and illustrated includes a leveling gage, the dial of which is calibrated in degrees to indicate perfect level; a toe gage engineered to eliminate inaccuracies caused by bent wheels or irregular tire walls; a checking instrument for gaging the camber, angle, caster tilt and king-pin inclination; and the Manbee Balance-Master, reported to be capable of meeting every tire-balancing problem. A section is devoted to a discussion, with explanatory diagrams, of the causes for wheel unbalance, and detailed instructions are given for checking the various wheel parts. Axle-straightening equipment is dealt with in a separate folder.

Users of automotive equipment may secure copies of this literature by writing direct to the manufacturer and referring to this publication.

Ed Galvin Now Heads Tyson Bearing Corp.

Ed R. Galvin, who has been General Sales Manager for R. G. LeTourneau, Inc., Peoria, Ill., since 1938, has resigned to become President and a Director of Tyson Roller Bearing Corp., Massillon, Ohio.

Mr. Galvin went to Peoria from Ohio in 1927 to join the Caterpillar Tractor Co. as a District Representative. He was soon promoted to Eastern Sales Manager and then to General Sales Manager. Resigning this position, he accepted a similar one at R. G. LeTourneau, Inc., in November, 1938. Under his expert leadership, more than 65 per cent of the new exclusive LeTourneau distributors have already been appointed.

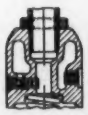
For 68 Years Builders of Fine WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio
Watch for Post-War Models

MAN! THIS TAMPER SURE HANDLES EASY AND RAMS HARD!
Thor BACKFILL TAMPERS
DO THE JOB QUICKER, BETTER... SAVE MONEY AND MAN HOURS!

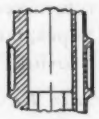
TAMP... THEN PAVE IMMEDIATELY NO DELAY!
No. 50RRT LIGHT DUTY
Lifts and carries its own weight... does not tire the operator. This light duty Thor Tamper will do more work and ram more fill far more effectively than several men with hand tools.
No. 60BFT HEAVY DUTY
For tamping clay and other stiff materials. Strong blows coordinate with the weight of the tool to provide perfect balance for easy handling.

You can tamp . . . then pave *at once* when you use smooth running, rapid, powerful-hitting Thor Backfill Tampers. These Thor Tampers *ram dirt hard*—put it firmly into place *to stay!* No coming back on a job again and again to backfill, you can lay your paving immediately!

AIR ECONOMY
Simple, efficient Thor Rocker Valve is designed to utilize every ounce of air that enters the machine. Gives long service with minimum wear. Tampers develop powerful blow under 90 pounds air pressure; will operate efficiently on 65 pounds.



POSITIVE LUBRICATION
Automatic lubrication system keeps oil distributed throughout the tools constantly. Keeps the valve block spring functioning perfectly. Reservoir holds sufficient oil for a full day's running.



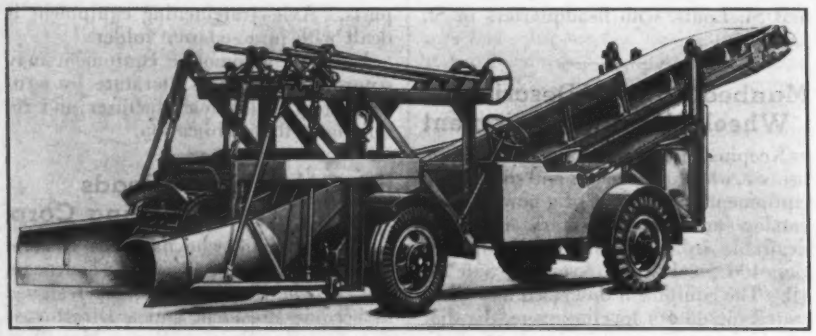
EXHAUST DEFLECTOR
Easily adjustable, simple to operate. Can be turned in any direction to blow the air down and away from the operator's legs.

FOR MORE FACTS about these *sure-hitting* Thor Backfill Tampers and the complete line of associated Thor Paving Breakers, Rock Drills, and other contractors' tools write today for Catalog 42-A.

SPECIFICATIONS

	No. 50RRT	No. 60BFT
Bore of Cylinder	1¼"	1½"
Length Overall	48¼"	49"
Weight	22 lbs.	29 lbs.
Equipment	5" Dia. Rd. Mall. Iron Butt	6" Dia. Rd. Mall. Iron Butt

Thor Portable Pneumatic and Electric Tools
INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.
Branches in Principal Cities



The new Athey Force-Feed loader.

New Loading Unit Is Self-Propelled

A new piece of equipment for use in highway and ditch construction and maintenance has just been announced by the Athey Truss Wheel Co., 5631 W. 65th St., Chicago 38, Ill. Operating as a companion machine to a motor grader, the new Athey Force-Feed Loader delivers surplus earth, sod, rock, sand, oil-mix and other materials into trucks for removal. It also permits the salvaging of valuable road surfacing materials for use on other jobs, or the removal and stockpiling of topsoil for later use in roadside-development work. The removal of windrows of debris thrown out from ditches during cleaning operations is another job handled by the loader.

The Athey Force-Feed Loader is one-man operated and travels under its own power at highway speed from one job to another. Further information may be secured direct from the manufacturer.

New Tamping Roller For Earth-Fill Jobs

Designed from the ideas of one of the country's largest dirt-moving contractors, the Gebhard tamping roller, made by the Shovel Supply Co., has a number of construction features. The frame, of 10-inch ship channel, is made in two halves, hinged in the middle to allow each roller to follow undulations in the fill. The rolls are constructed of ½-inch plate and are so designed that the ends are welded to a central tube or housing through which the shafts are inserted. At the ends of this tube are steel housings, machined to receive the adjustable Timken bearings. Diaphragms midway between the drum ends are provided to give added strength to the shell. The two halves of the roller are held together by means of four sets of heavy hinges which revolve around a central hinge pin extending entirely through the roller from front to back.

The feet are constructed from solid steel billets, and are wedge shaped, with the tamping surfaces hard-surfaced. Cleaner bars, constructed from 2 x 3-inch steel, are set at an angle to "peel" the mud from the drum as near the ground as possible, thus reducing draft. These bars are individually adjustable for wear and are rigidly held to the frame of each roll, front and rear.

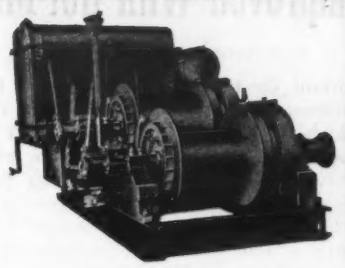
The overall diameter of the drums is 76 inches, the length of each drum is 72 inches, and the complete width of the roller is 14 feet 4 inches. Each roll has 144 8-inch feet, making a total of 288 feet. Empty, the roller has a bearing pressure of 425 pounds per square inch, and filled with water, a bearing pressure of 685 pounds per square inch.

Further information on this Gebhard tamping roller may be secured by contractors and engineers and by distributors interested in handling the line direct from the Shovel Supply Co., Box 1369, Zone 1, Dallas, Texas. At present equipment of this type must be released by the WPB under Limitation Order L-192, but the company is prepared to build them in quantity and is looking forward to post-war orders.

City-Wide Subway System Planned for Santiago

A commission of three engineers has been appointed by Santiago, capital of Chile, to study and report on preliminary plans for the construction of a city-wide subway system. Such studies already have been completed by the Chilean Department of Railways, which estimates that the cost, for construction and equipment, will be approximately $7,750,000. Santiago already has one subway under construction, which will connect the Alameda Station, terminus of the Southern Line of the Chilean State Railways, and the Yungey Station, terminus of the Santiago-Valparaiso route of the Chilean State Railways. This subway, the 1.8-mile tunnel of which is already completed, will replace a surface line running along a busy street between the two stations.

OK HOISTS for every purpose



As O.K. Hoists are made in many different models ranging from 8 to 150 horsepower, you are sure to get a machine that exactly meets your requirements.

Write for Latest Complete Catalog

O. K. CLUTCH & MACHINERY CO
Columbia, Pennsylvania, U. S. A.

NEW LOW-COST PROTECTION AGAINST RUST

FREE! This 36-page booklet shows how you can make your present equipment last not only for the duration, but for years to come.
RUST PREVENTION

HERE'S life extension for all equipment used by contractors, waterworks and sewage disposal plants . . . shovels, graders, concrete mixers and forms, screening plants, steel pipes, tanks, etc. . . . all metal exposed to corrosion, in use or in storage.

Texaco Rustproof Compound provides a penetrating, self-sealing film that is not only waterproof but highly resistant to chemicals and fumes. In many cases, costly chipping of existing rust and scale is eliminated. *Texaco Rustproof Compound* does not dry out, but remains soft, healing over any scratches and abrasions. It is much more economical—coat for coat—than paint.

Texaco Rustproof Compound has proven highly successful on leading railroads which have used millions of pounds for protection against the weather, salt brine drippings, flue gases, etc.

Write for free booklet entitled "Rust Prevention." It tells *how Texaco Rustproof* prevents rust, *where* and *how* to apply it and why it is so successful. Every industrial executive and engineer should have a copy. A single suggestion in this booklet may save thousands of dollars. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO Rustproof Compound

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

SAND'S Aluminum Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8611 Gratiot Ave. Detroit 13, Mich.

Speed and Economy In Airfield Paving

Training Fields for Navy Built Quickly, and Change From Pioneer to "Tailored" Design and Construction

✦ THE design and construction of airfields for training Naval aviation cadets in the Pensacola, Fla., area have undergone great changes. This article describes the character of the terrain, the expedients of construction developed under the pressure of rapid expansion, and the results accomplished. Canal Field is chosen as the first subject because it was one of the first outlying practice fields with mixed-in-place runways, and the experience gained at the field aided in improved designs and construction for later fields. Work at Bagdad Field represents later design, methods and construction.

The coastal plain on which practically all of the training fields operated in connection with the Naval Air Training Center at Pensacola, Fla., are built is flat, draining slowly and toward the south or Gulf side. The original approach to the creation of outlying training fields was to choose a suitable section of the countryside, clear and grub the area, and grade the terrain as it existed, without much thought to additional drainage. Construction operations were carefully conducted with an eye toward saving all the natural grasses possible in order to establish a sod. Water falling on the surface of these fields was dissipated by absorption and by following the natural courses of run-off.

Canal Field

At Canal Field there are three runways, each 3,600 feet in length and 300 feet wide. At first the design contemplated no improved shoulders. Since the field was in an exceptionally low area with the north boundary at elevation 16.0 and the south boundary at elevation 9.0, and the water table was located from 1 to 2 feet below the surface, definite efforts were made to lower the water table. Initial drainage was provided by a north-south ditch on the west border of the field, which has an area of approximately 450 acres. To check the flow of water onto the field from the north, an east-west drainage ditch was cut across the north side of the field, leading to and intercepting the existing north-south ditch at the northwest corner of the field. The upper end of the east-west ditch was at elevation 13.0 Mean Sea Level, and the discharge of the north-south ditch was through an existing highway culvert at elevation 8.0 MSL, which greatly limited the effectiveness of the drainage system which was about ¾ mile in length.

On April 21, 1943, two traveling mixers were put onto the field and the mixing operations on all runways was completed by May 7, in a total of 17 working days. This work consisted of mixing and laying a 6-inch asphalt pavement 322,667 square yards in area, requiring 1,742,402 gallons of RC-1 asphalt. The speed of application was over 100,000 gallons per day, establishing a record for this area at that time. An additional four weeks of work was required in the pavement-finishing operation.

Official U. S. Navy Photo
An elevating grader at work on the runway of a Naval Aviation Cadet training field.

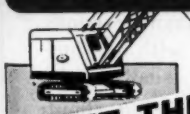
The subgrade material varied from a fine uni-sized saturated sand which contained a considerable quantity of organic matter to a highly plastic clay. This local material was used for the road-mix operation for the runways. As soon as the runway paving was completed, the drainage was shown to be unsatisfactory, and this started the idea of

(*Continued on page* 44)

Isaacson Kable Power Units eliminate those tiresome tuning up jobs before "Blue Top" finishing. This is a feature your operator will appreciate, and one that will save you money on your show. Gone, too, is the finicky balance between clutch and brake adjustments. This new improved Kable Power Unit is not an untried and experimental flash. . . . No, sir; for three years these units have been on the job in tough, grinding day-in and day-out service. They have proved themselves beyond the shadow of a doubt; and we know they stand up to that high standard of performance you are entitled to expect of quality tractor equipment. Write for detailed specifications.

ISAACSON
SEATTLE
ENGINEERED TRACTOR EQUIPMENT

GREATER POWER
EASIER HANDLING
LONGER LIFE



GET THINGS DONE with
GATKE
High-Heat-Resisting Asbestos
BRAKE MATERIALS

Service-proved for every Brake and Clutch requirement of Excavating, Road Building and Construction Equipment. Just tell us what you need.

GATKE MAKES
Brake Lining
Clutch Facings
Frictions
Non-Metallic Bearings
Sheet Packing

GATKE CORPORATION
224 N. LaSalle St. Chicago

Caterpillar to Build Earth-Moving Units

Extensive and important additions to its line of products have been announced by the Caterpillar Tractor Co., Peoria, Ill., to become effective at such time in the future as military requirements permit. These additions to the Caterpillar line, which now includes diesel track-type and wheel tractors, motor graders, diesel engines and electric sets, will consist of a wide range of earth-moving machines, including bulldozers, scrapers, rippers, and cable control units, matched both to current sizes of Caterpillar crawler tractors and to the present and future sizes of rubber-tired wheel-type prime movers.

The decision to expand its line is the result, Caterpillar executives state, of the company's desire to provide maximum service to the earth-moving, construction and road-building industry. The newly announced program will make it possible to provide customers with a complete "package" of machinery for earth-moving jobs. The bulldozers, scrapers, rippers and cable control units, which will be matched in capacity to the power of the prime mover, and in design, materials and workmanship to present Caterpillar products, will be sold and serviced through Caterpillar dealers, providing the customer with the advantage of a single channel of distribution, a single point of responsibility, and a single source of service and replacement parts, the announcement states.

The new program is a partial departure from Caterpillar's past practice of relying upon other manufacturers to produce all of the numerous types of equipment for use with Caterpillar tractors.

How Zinc Saves Steel From Rust and Corrosion

Perhaps in no other period during the past twenty-five years has there been so much attention focused on metal protection through the application of paint coatings as at the present time. The necessity to preserve countless tons of steel against rust and corrosion has brought unprecedented demands on suppliers of all types of metal protective finishes, and new and improved coatings have been placed in service as fast as they could be applied.

All through this development, zinc pigments have played an important part in the various paint formulations. In an interesting new booklet "How Zinc Saves Steel from Rusting", the prevention of corrosion, the functions of metal protective paints, and the various uses of zinc in these paints are discussed. A section on testing metal protective paints, and primer and finish-paint specifications requiring zinc pigments in their formulation are included.

This booklet is offered without obligation by the New Jersey Zinc Co., 160 Front St., New York 7, N. Y., at this time as a guide in evaluating the paint coatings which will be offered in the post-war period, and as an aid in meeting present-day metal protective paint problems. Copies may be secured by state and county highway departments and interested contractors direct from the company.

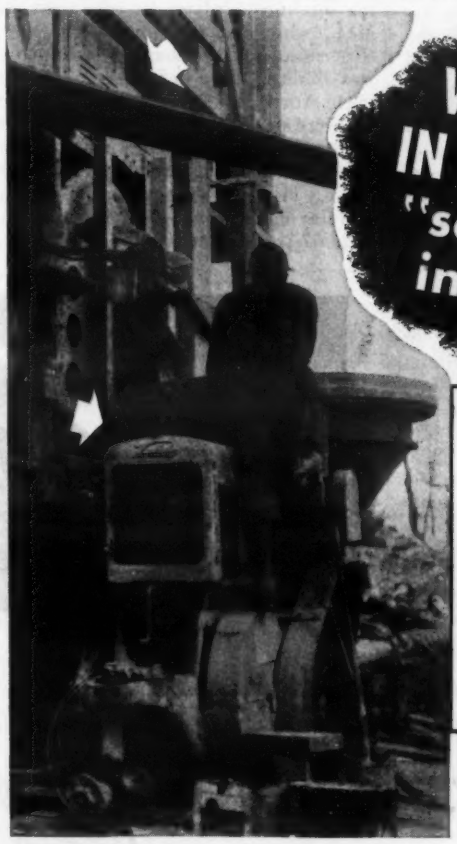
3 REASONS for Using Standard Twin Disc Clutches!

1. By specializing in clutch manufacture the clutch specialist is able to combine the economies of volume production with the maximum in performance and wear-life qualities.

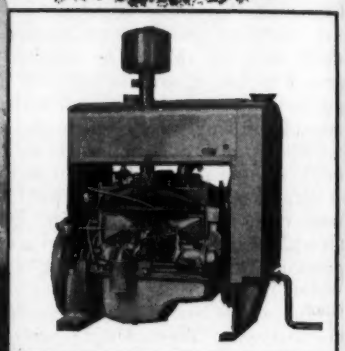
2. By eliminating the use of "Specials" you assure complete replacement parts stocks with a moderate investment. Thus the clutch specialist is prepared to give you the best of service . . . supply needed parts at moderate prices.

3. By working closely with the designer of engines and material handling equipment the Twin Disc Clutch Company has developed a varied line of friction clutches which meets every need. Their record of performance in the construction field is your assurance of uniformity and adequate wear-life.

That's why, in the designing of a new piece of equipment, you'll find it to your advantage to use *Standard* Twin Disc Clutches. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



WAUKESHAS IN WAR WORK "somewhere in Alaska"



MODEL FCU WAUKESHA ENGINE—A rugged 4-cyl. power plant, 3¼" bore by 4" stroke, 133 cu. in. displ., for operation in 20 to 30 hp. range.

IN WARTIME every Waukesha Engine is a war-work engine. Here are two Waukeshas on a government war-work installation "somewhere in Alaska." You can barely see the housing of the one powering the Rex 28-S Concrete Mixer . . . it's just above the mixer drain.

The other is driving a Rex 160 Pumpcrete. This Model FCU Waukesha Engine is as rugged as the Alaska terrain. To power the pump that pumps concrete—as far as 800 ft., or as high as 100 ft.—it *has* to be rugged. But it's *smooth*, too . . .

Structurally rigid and finely balanced . . . that's why! Cylinders and crankcase are one piece. The husky, closely balanced crankshaft . . . fitted with accurately matched piston and rod assemblies . . . rides on three renewable precision-type bushings, each 2⅛" in diameter and that's big for a small engine like this.

Its Waukesha Blue Flame Manifold, in combination with the Controlled Turbulence combustion chamber, gives instant response to power and load requirements . . . and more power with less fuel at partial or varying loads under which most engines usually work.

Today every Waukesha is made for war work. Find out about Waukesha Engines for *your* future peacetime needs.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES

MORE POWER FOR VICTORY

WAUKESHA ENGINES

☆ Buy A Share In America ☆

Lend a HELPING HAND with your WAR BONDS

Long River Bridge Spanning Ogeechee

Continuous River Spans, Concrete Deck-Girders In Approach Structure Carry Georgia Highway

✦ THE Ogeechee River, subject to extreme high water, could not be permitted to impede traffic on the important highway, U. S. 80, between Savannah and Macon, Ga., so a contract was awarded to H. G. Smith of Fitzgerald, Ga., for the construction of a 1,344-foot bridge having continuous I-beam river spans and concrete deck-girder approaches, to replace an old wooden structure inadequate for present needs.

General Design

The main bridge consists of a 36-inch 182-pound I-beam cantilever unit, with spans of 60, 90 and 60 feet. I-beams 73 feet 6 inches long form the 60-foot spans, extending 13 feet 6 inches beyond the two channel piers, and carry the central-span I-beams which are 63 feet long to make the 90-foot span. The approach structure is made up of twenty-seven 42-foot concrete deck-girder spans. All piers are set on untreated-timber piling driven through the river silt into the underlying marl. The roadway is 26 feet wide, with a 4-foot sidewalk on one side.

Under the same contract a relief opening consisting of five 35-foot concrete deck-girder spans was constructed in the long fill east of the approach structure. The design was similar to that of the channel bridge except for the omission of foundation piling under the relief structure.

To reduce the need for critical materials, the design called for the placing of the expansion ends of the concrete girders on two layers of 3-ply graphite packing instead of the usual sliding plates or similar expansion devices of metal.

Foundations

For the two channel piers, steel sheet piling was driven by a Vulcan double-acting steam hammer mounted in swinging leads handled by a Northwest crane working from falsework bents. Steam to operate the hammer was piped from a 15-hp portable wood-fired horizontal Frick boiler placed on the bank of the river. After the steel sheeting had been driven, the same crane was equipped with a clamshell bucket, and excavation, averaging 10 feet into the marl, was completed. It was unnecessary to blast the marl but the digging was often slow and difficult.

A second Northwest crane, using a 2,000-pound drop hammer from swinging leads, drove the untreated foundation piling 12 to 15 feet below the bottom of the excavation to a bearing of from 25 to 28 tons per pile. The two channel piers each rest on forty timber piles while the piers at the ends of the steel structure are supported by thirty-two piles each.

The concrete seal, 10 feet square under each column of the land piers and 10 x 12.5 feet under the columns of the channel piers, was poured 7 feet thick, using a bottom-dump bucket made by the contractor. The bucket was handled like a clamshell by two lines from one of the three Northwest cranes on the job.

A rather unusual procedure was followed by pouring the channel-pier footings to the lines of the steel sheeting and underlying seal rather than forming them to a rectangular plan. Pouring in this manner gave the footings, exposed at low-water stages, a fluted-edge appearance which is not common.

For the piers under the approach structure it was unnecessary to drive steel sheeting. Wakefield piling with 12 x 12-inch wales at the bottom and 4 x 8-inch wales at the top was used at these piers. The excavation was done by clamshell, the marl, where necessary, first being loosened by Ingersoll-Rand spades, the air for which was furnished by a Worthington 60-cubic-foot compressor.

Nine piles were driven under each column of the double-column approach-structure piers, using a drop hammer in swinging leads handled by the Northwest cranes. This piling was driven to a penetration of 18 to 20 feet and a bearing of approximately 23 tons.

No seal was necessary and the footings were made 3 feet thick with the pile heads embedded 1 foot in the concrete. In some locations, when the three available cranes were busy with other work, the concrete was handled by a skid stiff-leg derrick equipped with a LeRoi engine furnishing the power for a Clyde 2-drum hoist. The unwatering of all wet foundations was handled by a 4-inch Novo centrifugal pump.

Piers and Column Bents

The two columns which carry the concrete caps for each bent of the approach structure, as well as the river piers, average 20 feet in height. For the approach structure they are 2 feet 3 inches square with no batter and spaced 18 feet apart with no connecting web wall. For the river piers the columns are 3 feet square at the footing with a batter

(*Concluded on page 54*)

»» For HOSE BOOTS, CLOTHING or PUMP DIAPHRAGMS

Call YOUR Continental BRANCH

Immediate Delivery from Local Stock

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Baltimore	Kansas City
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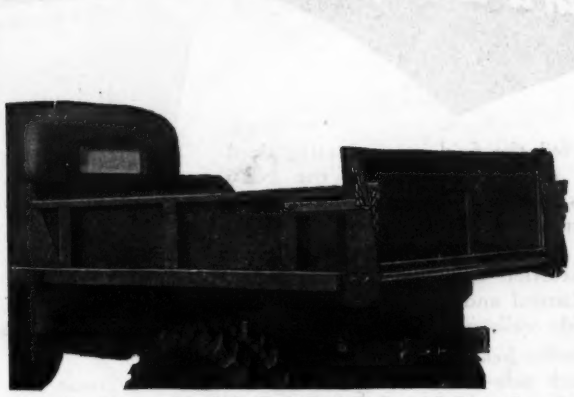
CONTINENTAL RUBBER WORKS
ERIE, PENNSYLVANIA, U.S.A.

HERCULES

HYDRAULIC HOISTS and DUMP BODIES

GIVE DEPENDABLE SERVICE ON ALL KINDS OF JOBS



Hercules Removable Side Rub Rail Body with hinged rear corner posts. Available in many sizes.

Hercules High Dumper—Power up, power down with 78° dumping angle. Equipped with 12 ton capacity hoist.

HERCULES HYDRAULIC BOOSTER HOIST

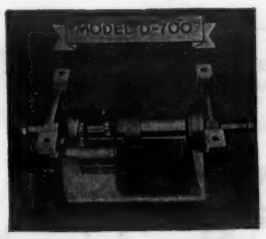
Makes any truck a Dump Truck

Install HERCULES DOUBLE-ARM HYDRAULIC HOISTS under your platform, stake, express or special bodies, which are now idle. Unload the easy way!

This is the Model KXE Hoist, with 6" cylinder, for bodies up to 12 feet long. Body reinforcing plate and steel sills included. Control valve is operated from driver's seat.

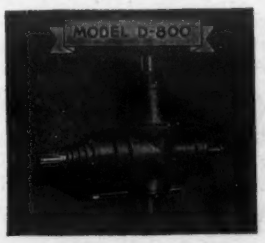
USE THE HERCULES SPLIT-SHAFT POWER TAKE-OFF

To operate any truck-mounted equipment



Direct (D-700 Series), Side (D-800 Series) and Dual Drive (B) models are available for operation of almost every possible type of truck-mounted equipment, either singly or in combination.

Recommendations and complete specifications upon request.



HERCULES STEEL PRODUCTS CO.

GALION, OHIO

Highway Activities In Escambia County

(*Continued from page 7*)

hauled from 8 to 10 miles and mixed to form the surface layer. In the southwest section of the county there is an area of muck and sand where the muck is used in place of clay as a binder. The roads are maintained by power and pulled graders, with convict labor for the required hand work.

Organization

There are five county commissioners elected at large by the county but who must live in their districts. Two of the commissioners are elected from Pensacola and the other three from Districts 3, 4, and 5. Each commissioner is elected for a period of two years, and the board appoints the County Engineer for the period of their term. Mr. Wheat has been County Engineer continuously since 1919, except for a period of one and one-half years. Each commissioner handles the road work within his own district and is responsible for the county equipment in that district.

Equipment

The county owns 36 trucks of 1½-ton capacity, all of which are equipped with dump bodies except three pick-ups. The distribution of equipment in the three Districts is as follows:

DISTRICT 3: Austin-Western 77 Junior patrol grader with tandem drive
International-Coleman K-6 truck with underbody blade
Caterpillar D4 tractor
Caterpillar No. 33 pulled grader
Allis-Chalmers 3-wheel Speed Maintainer

DISTRICT 4: Galion patrol grader, tandem drive
Allis-Chalmers HD-7W diesel tractor
Adams No. 105 pulled leaning-wheel grader

DISTRICT 5: 3 Galion patrol graders
Caterpillar No. 44 hand-control pulled grader
Caterpillar D6 tractor
Galion No. 10 hydraulic-control leaning-wheel grader

Each road district has a convict camp with a shop in which free labor is used. Free labor also is used as truck drivers.

The parts problem has not been bad until recently, as the county was fortunate in having had a stock of parts well ahead of its needs, but now this problem has become acute. The great difficulty in county road maintenance has been the county secondary roads. The main roads to the U. S. Naval Air Station and Fort Barrancas and the outlying airfields are all on the state highway system, but the personnel lives, to a large degree, on county roads. This has been recognized in allotments of parts for county road maintenance equipment, but finding the parts is the real difficulty today.

Finances

The income for the operation of the Escambia County Highway Department comes from the Florida gas tax and the county road fund. In the fiscal year ended October 1, 1942, the gas tax income was $23,176.47, while last year it was $1,458.27. The road-fund income from county taxes for the fiscal year ending October 1, 1943, was $129,214.52.

Dorsey Catalog Describes Truck, Tractor Equipment

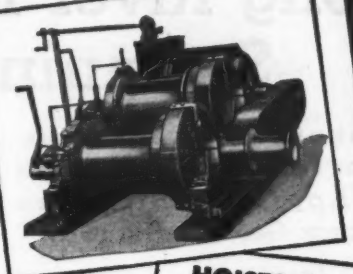
A complete line of truck and tractor equipment, with special emphasis on trailers, is described and illustrated in a catalog issued by Dorsey Brothers, Elba, Ala. A variety of trailer types is covered, including Models D and E in 8, 10 and 14-ton capacities; Model C available in 8 and 10-ton capacities; the Model L with a new and larger axle designed for more rugged transportation, and with a capacity of 16,000 pounds; the Model M heavy-duty machinery trailer in 15 and 20-ton capacities; the 4-wheel Model F-W trailer of 8, 10 and 14 tons; and the Model A-3 6,000-pounds-capacity tilting platform said to be adaptable for hundreds of different hauling jobs. Special features embodied in this equipment are also described, such as a specially designed trailer brake for quick control, the new one-section tubular axles, and a semi-automatic fifth wheel which is adaptable to all truck widths.

Copies of the catalog may be secured upon request to the manufacturer and mention of this publication.

Robins Announces Return Of Major Maurice Bradley

Robins Conveyors Inc., of Passaic, N. J., has announced the return to its Sales Department of Major Maurice B. Bradley, who has been serving with the Anti-Aircraft Artillery, Eastern Defense Command, and has now completed the work which called him into active service in 1942. Since joining the Robins organization in 1934, Mr. Bradley has served in both the Detroit and Cleveland territories. He will now be located at the Passaic headquarters and will devote his attention primarily to the sale of vibrating machinery.

Hoists to Fit the Job



Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency *on the job*. There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire *first* of LIDGERWOOD.

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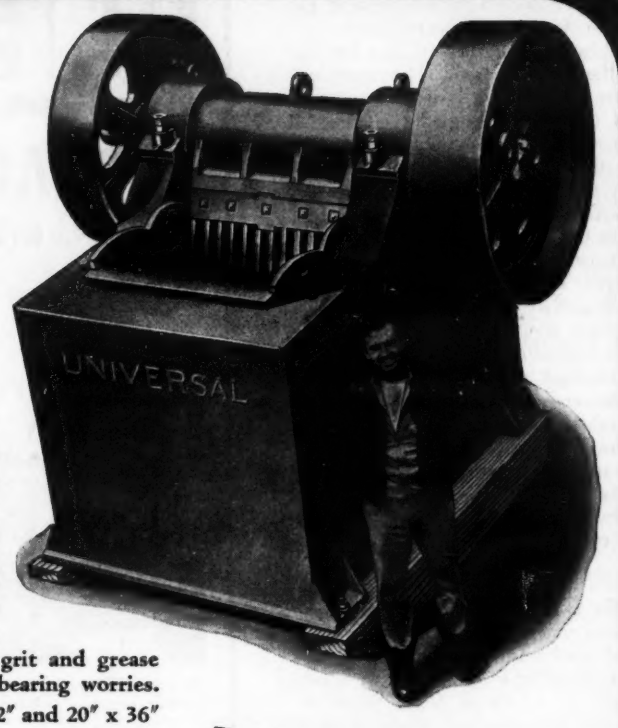
This big bruiser is not as heavy as it looks (but it's tougher than it looks!)



Universal has led the field in eliminating deadweight—we've done it again with the NEW "WRB" series *welded steel plate* crushers with cast steel pitmans. Not an ounce of excess metal, yet all the structural strength necessary to prevent distortion of frame or misalignment of bearings. Lateral and transverse ribbing and heavy plate side walls assure absolute stability.

Four big SKF roller bearings—two on the pitman and one on each side—labyrinth sealed against grit and grease and Alemite lubricated, assuring freedom from bearing worries.

Two sizes available in the "WRB" series—30″ x 42″ and 20″ x 36″ feed openings; other sizes later.

A number of Universal "WRB" Crushers are in use. Users of the 30″ x 42″ report from 150 to 200 tons per hour of 4″ material. A 30″ x 42″ crusher on a primary crushing unit built for Art Overgaard, Elroy, Wisc. is shown below. Send for bulletin on the "WRB" line.

The overhead eccentric type jaw crusher, first built by Universal in 1906, has become the most widely accepted method for primary reduction of rock and gravel. While there have been improvements in materials, bearings and construction, there has been no major improvement in this basically sound method of crushing which provides two crushing blows with each revolution of the eccentric—a preliminary blow in the mouth of the crusher and a further reduction in the throat, at the bottom of the crusher. Some of these early crushers are still in use. The Universal "WRB" series employs this original highly efficient crushing principle.

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Problems of Maintenance Of North Carolina's Roads

Greatest Difficulty Is Man-Power; Work Curtailed To Essentials; Use of Prison Labor a Help

By BERRIEN W. DAVIS, State Maintenance Engineer, North Carolina State Highway and Public Works Commission

✦ SINCE Pearl Harbor, the difficulties of adequate highway maintenance caused by the shortages in men, machines and materials have dwarfed financial difficulties. First it was materials, then it was men and machines, now it is primarily man-power. Machines are fast wearing beyond efficiency, and many of them are standing idle awaiting repair parts, but regardless of all other shortages, the main difficulty today is men.

Road repairs and replacements are not keeping pace with the toll being exacted by increased freight traffic and the ever present actions of the elements, and it is obvious that repair and replacement needs are accruing as the emergency period extends. The shortage of men, machines and materials and the subsequent curtailments have been severe on North Carolina roads, but it has not been deemed necessary or advisable to abandon a single mile of road because of war conditions. However, it has been necessary to discontinue construction, except on access roads, practically discontinue all betterments, and reduce maintenance activities to essential operations.

North Carolina's combined system of state and county roads is under the jurisdiction of the State Highway and Public Works Commission, and is maintained by state forces with state-owned equipment. The various types of highways in the 60,461.6-mile system are shown in the accompanying table in the upper right-hand corner of this page.

Highway Expenditures

The average annual expenditures for highways in North Carolina for the five years prior to the war (1937-1941) was $26,600,000, divided as follows:

Construction	$9,000,000
Betterment	7,400,000
State maintenance	3,500,000
County maintenance	6,200,000
Municipal maintenance and betterment	500,000
Total	$26,600,000

Construction expenditures are now confined to access roads, which means, for all practical purposes, that worn-out roads are not being replaced, so the added expense and work of maintaining these worn-out and obsolete roads is placed on the maintenance organization. Bituminous retreatments have been the extent of betterments for the previous years of the war and will be the extent of betterment for the current year.

During 1944, bituminous retreatments will amount to approximately $1,200,000, if transportation and materials are available to take care of such a program. This means that the usual annual expenditure of $9,000,000 for construction is eliminated, and the $7,400,000 for betterments is reduced to $1,200,000. The other items of expenditure will remain approximately unchanged. Hence the total expenditures for the current year will be $11,400,000, or 43 per cent of the average annual expenditures for the five years prior to the war. The reduction in expenditures does not give the whole picture, because labor is higher, the skilled and specially trained labor which has been lost cannot be replaced, materials that are available are more expensive and less effective, equipment cannot be replaced, and repair parts are hard to obtain.

Summary of North Carolina's 60,461.6-Mile Highway System

Type	State Highways Rural (Miles)	County Highways Rural (Miles)	Municipal Highways State (Miles)	Municipal Highways County (Miles)	Total Miles
Non-Surfaced	256.9	24,595.0	4.1	12.9	24,868.9
Soil, Gravel or Stone Surface	1,156.8	21,437.4	18.5	578.9	23,191.6
Total, Non-Hard Surface	1,413.7	46,032.4	22.6	591.8	48,060.5
Bituminous Surface-Treated and Mixed Bituminous (Low Type)	4,946.9	1,521.4	279.5	197.4	6,945.2
Bituminous Concrete and Sand Asphalt (Hot-Mix)	1,172.5	355.4	329.6	138.5	1,996.0
Portland-Cement Concrete	2,703.0	191.9	324.5	53.3	3,272.7
Miscellaneous	116.1	35.0	29.8	6.3	189.2
Total, Hard Surface	8,938.5	2,103.7	963.5	395.4	12,401.1
Grand Total	10,352.2	48,136.1	986.1	987.2	60,461.6

Low-Cost Bituminous Roads

The 6,945.2 miles of roads classified as "bituminous surface-treated and mixed bituminous (low type)" present a special problem of maintenance. During the three years prior to the war, we had twenty crews at work resurfacing from April to November, and our retreatment program averaged 1,670 miles a year, with 25 to 50 per cent of this mileage retreads 1 to 2 inches in thickness.

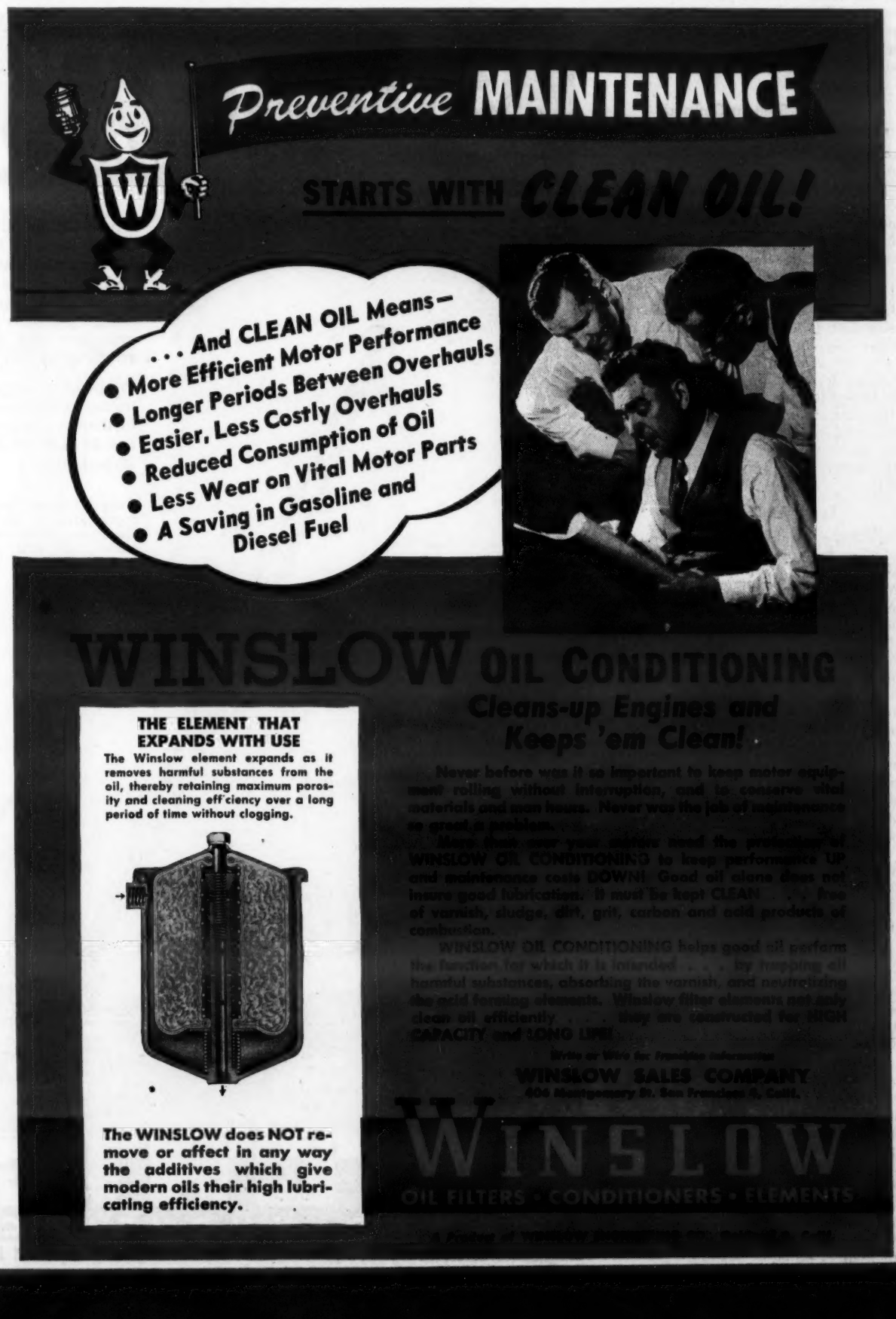
This program has necessarily been curtailed as indicated by the following figures:

	Bituminous Material (Gallons)	Crushed Stone and Gravel (Tons)
Average amount used per year during three years prior to the war	19,000,000	600,000
Amount used in 1942	5,300,000	160,000
Amount used in 1943	6,300,000	215,000
Estimate of amount to be used in 1944	12,000,000	400,000

These quantities include material used for patching but do not include the local sand used.

The retreatments consist of 0.35 to 0.40 gallon of bituminous material and approximately 35 pounds of aggregate per square yard. The application of this

(*Continued on page* 46)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Types of Contracts For Construction Jobs

(*Continued from page* 16)

Where the cost of day-labor construction is to be investigated, all essential and appropriate items must be included if the true cost is to be ascertained. Essential items which are sometimes omitted include charges for overhead, depreciation of equipment, equipment rentals, and other items of less importance.

Plans and specifications for new highway construction are well standardized. A large number of contractors are well acquainted with the requirements for highway construction. Consequently probable cost can be estimated in advance of construction. There is little need for day-labor methods on such work, provided plans, specifications and estimates are completed before funds become available for the project. Under the day-labor system, plans, specifications and detailed cost estimates usually are not available at the time of starting the project, and the final cost may remain unknown until long after the work is completed.

Contract System Defined

Under the contract system a single construction agency assumes the full responsibility for the completion of the project. The contractor usually agrees to furnish all labor, materials, and equipment required for the construction and to complete the work according to plans and specifications. The contractor also agrees to protect the owner from all losses due to damage suits, liens or other causes. He provides a highly specialized skill, assumes the financial responsibility for the completion of the work, and is usually required to complete the work within a specified time. The owner does not assume any financial responsibility for the completion of the work. Obviously, the responsibilities of such an undertaking should be placed only in the hands of specialists in this field.

Types of Contracts

There are several forms of contracts, including the cost-plus-percentage contract, cost-plus-a-fixed-fee contract, negotiated lump-sum contract, competitive lump-sum contract, and unit-price contract.

Under cost-plus-percentage contracts, the contractor agrees to complete the project for its actual cost plus a fee for his services. Such a fee may be on a direct percentage of the cost, or on a sliding percentage of the cost.

The contractor working under a cost-plus-a-fixed-fee contract agrees to complete the project for the actual cost plus a stipulated amount. Under the provisions of the negotiated lump-sum form of contract, the contractor binds himself to furnish all the materials and labor and to complete the project for a stipulated amount. In this case, the owner negotiates with contractors selected by him as competent to handle the work. By a competitive lump-sum form of contract, the contractor agrees to furnish all materials and labor and to provide a completed project for a stipulated amount determined as a result of competitive bidding.

Under the unit-price form of contract, a price is bid for each unit of construction as set up in a bid schedule. Briefly, the bidder is required to insert a bid price opposite each pay name for which a quantity appears in the bid schedule as prepared by the engineer.

After an exhaustive study and discussion of various forms of contracts, J. A. L. Waddell, well-known consultant and engineer, recommended in the 1919-20 *Transactions* of the American Society of Civil Engineers, an "Ideal System of Contract-Letting and Profit Sharing" which, among other desirable features, calls for each bidder to submit unit-cost prices.

Substantially all highway construction done by state highway departments with or without Federal Aid, as well as street work done by the larger municipalities, is by the unit-price form of contract.

Federal Aid by Contract

Federal-Aid highway construction is carried out by contract methods using the unit-price type of contract. Under the rules and regulations for carrying out such construction, it is required that no part of the Federal money set aside on account of any project shall be paid until it has been shown that adequate methods, either advertising or other devices appropriate for the purpose, were employed prior to the beginning of construction to insure economy and efficiency in the expenditure of such money. An advertising period of two weeks may

(*Continued on next page*)

For ease of assembly and speed of installation of expansion and contraction joints,

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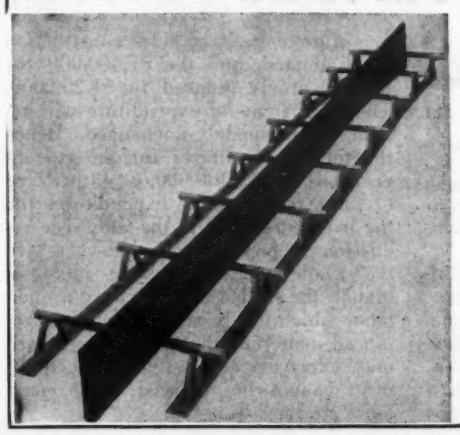

It brings extra profits to the *contractor* by reducing installation costs to a minimum;

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Rugged I-beam Outriggers (optional) slide out for instant use. Obtainable for center, for rear, or for both positions.

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Why Prequalification? The Pros and Cons

(*Continued from preceding page*)

be accepted, provided a suitable mailing list of contractors is maintained by a state highway department to whom notices of new work are mailed, and adequate public advertisement over a specified period is carried out. Substantially all contracts for the construction of Federal-Aid highways require the contractor to furnish all materials entering into the work.

No procedure or requirement is approved which is designed or may operate to prevent a submission of a bid or the award of a contract to any responsible contractor whether resident or non-resident of the state wherein the work is to be performed. Federal legislation and regulations are specific with regard to highways constructed with Federal Aid and they are recommended for study and use.

Prequalification

Prequalification of public works contractors has been rather generally adopted in one form or another, although its widest peacetime use appears to have been in connection with state highway construction. Nearly all states have laws or regulations dealing with the subject.

During the war emergency, prequalification has been a necessary proceeding in connection with the awards of Federal cost-plus-a-fixed-fee and negotiated lump-sum contracts and in the selection of invitation bidders. Among the advantages commonly attributed to prequalification are the following: 1. It provides adequate time for determination of the contractor's qualifications before bids are received, thus obviating the necessity for hasty and frequently incomplete investigation of the low bidder after the bids are opened; 2. It eliminates pressure often brought to bear upon the awarding authority to accept the bid of an unsuitable contractor; 3. It prevents the public criticism which sometimes arises when an awarding authority disqualifies the low bid and makes the award to a higher one; 4. It influences contractors to build up their qualifications to definite standards and thus creates a larger group of qualified contractors; 5. It discourages the activities of so-called shoe-string operators who do not possess the responsibility or resources necessary to surmount unforeseen construction difficulties.

On the other side of the question, the following arguments are sometimes advanced: 1. Prequalification opens the way to restriction of competition for political reasons or to favor local contractors; 2. It offers an opportunity for collusive bidding, especially if the qualified bidders are regularly in competition with each other; 3. It retards participation by new organizations which, through the process of small beginnings and sound growth, would eventually qualify and replace organizations retiring from the field; 4. It becomes a factor in the establishment of trade barriers between the states, thus restricting interstate commerce and free competition.

Experience covering the past fifteen years appears to have justified the arguments in favor of prequalification. There seems to be little doubt that the idea is a practical and helpful one, capable of producing beneficial results. In those occasional situations where the procedure has proved relatively ineffective, the reason usually may be traced to defects in the laws or regulations governing its operation. During the war, contractors have accustomed themselves to Federal prequalification and there is cause to believe that the subject will obtain wider recognition when peace returns.

Standardization of forms and data requirements would perhaps do more than anything else to promote the use of prequalification.

Contract Information

Since the last World War, additional facilities have been provided whereby officials and financial interests can obtain needed information regarding the qualifications of contractors. In 1924, committees representing the principal technical, official and trade organizations interested in construction, recommended the establishment of an independent agency which would investigate the business reputation and construction ability of contractors. As a result of this recommendation, construction and surety interests in 1929 cooperated in the establishment of the Bureau of Contract Information. This is an independent non-profit institution financed principally through subscriptions from

(*Continued on page 74*)

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Manufactured by SERVICISED to conform to Federal Spec. SS-F-336 and C.A.A. Spec. P-605, *Para-Plastic* is recognized in the concrete construction field as the one-time sealer for long-time service in Expansion and Dummy joints.

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With the exception of a restricted amount of much-needed civilian fire apparatus, our Ward LaFrance Truck Division factories are making nothing but military vehicles today. However, authorization has been received to manufacture a limited number of commercial trucks for civilian use during the latter part of this year. They will embody typical Ward LaFrance automotive engineering skill, and incorporate improvements born of this war. Why not write our Sales Department now.

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Urban Highways Need Development

Major Highway Problem Now Is Moving Traffic To Center of Cities With Speed and Safety

By HERMAN A. MacDONALD, Commissioner, Massachusetts Department of Public Works

✦FROM the beginning of Federal Aid, highway construction has been principally a program of rural road development, and many such routes have been completed over the years. However, to anyone who travels to any extent by motor vehicles, it is quite plain that something must be done to take care of the terrific congestion of highway traffic in urban centers. The day has gone by when we can believe that all that is required of highway construction is to build highways up to the city gates and stop there. A long-suffering public has decreed that there must be some relief, and practically all highway officials, from the Public Roads Administration down through the various state highway departments, are convinced that relief must be given in this direction.

One of the deterrent factors in this particular development has been the high cost of urban construction in comparison to construction in the open country. But we must face the facts: that, regardless of this and other obstacles, provisions must be made for safe, swift and uninterrupted traffic in urban territory, as well as in the open country. For a motorist gains nothing if he has a smooth uninterrupted journey to the city and then is held up there an inordinate amount of time or runs the risk of being crushed in a traffic jam.

Statement of the Problem

The Director of Highways of California has put the situation very well in a letter to me which reads, in part, as follows: "The experience we have had in California is probably more or less representative of the practice in other states. After the establishment of the state highway departments and the solution of the financing of construction of state highways, all of the efforts of these departments were directed toward the improvement of a system of highways throughout the state, which were practically all rural in character. The only urban aspects were those encountered as the road approached the city limits. This is where the improvement stopped.

"In some instances, it was possible for the cities to meet the situation and provide improvement of certain of their city streets to tide the matter over for some time; but that was not true of the majority of cities, and undoubtedly the problem was considerably more severe in the larger centers of population where a number of such important roads enter.

"The first move toward relieving the situation in California was during the 1920's. At that time, provision was made for the state to carry highways through smaller communities with 2,500 or less population. The problem, however, became increasingly difficult. Inadequately improved routes into and through cities caused congestion, and this congestion increased to such proportions in some of the larger municipalities that it was practically impossible to operate an automobile through the streets with any comfort or safety, and certainly not with any speed. Local traffic, mingled with a large volume of through traffic, produced congestion for both classes."

In New York State it is the same story. Millions should be spent to secure some relief from congestion in urban centers. In New Jersey a large amount of the highway expenditures is for the purpose of taking care of traffic through cities, and a report states that "The conception of the state highway system as being rural connections to the populous centers is fast disappearing. Cities are our greatest traffic potential and our greatest bottlenecks."

The Commonwealth of Pennsylvania is planning to spend $43,000,000 in Philadelphia, $20,000,000 in the city of Pittsburgh, and $95,000,000 in urban by-passes.

We have neglected the solution of the problem of moving traffic swiftly and safely over short distances in a short period of time. Although surprising to many people, by far the greatest percentage of motor-vehicle trips are relatively short in distance. Through nation-wide traffic surveys, we find that from 80 to 90 per cent of the traffic approaching the average large city is destined to enter the city itself.

By-passes around the smaller municipalities are obviously needed and, to a certain extent, they are essential around the large cities, because they not only carry the through traffic around the cities but act as feeders from which arterial routes into the city may be located.

From the traffic surveys, however, it is quite apparent that the most important problem is to get the traffic into the heart of the city itself. This means

(*Concluded on page* 70)

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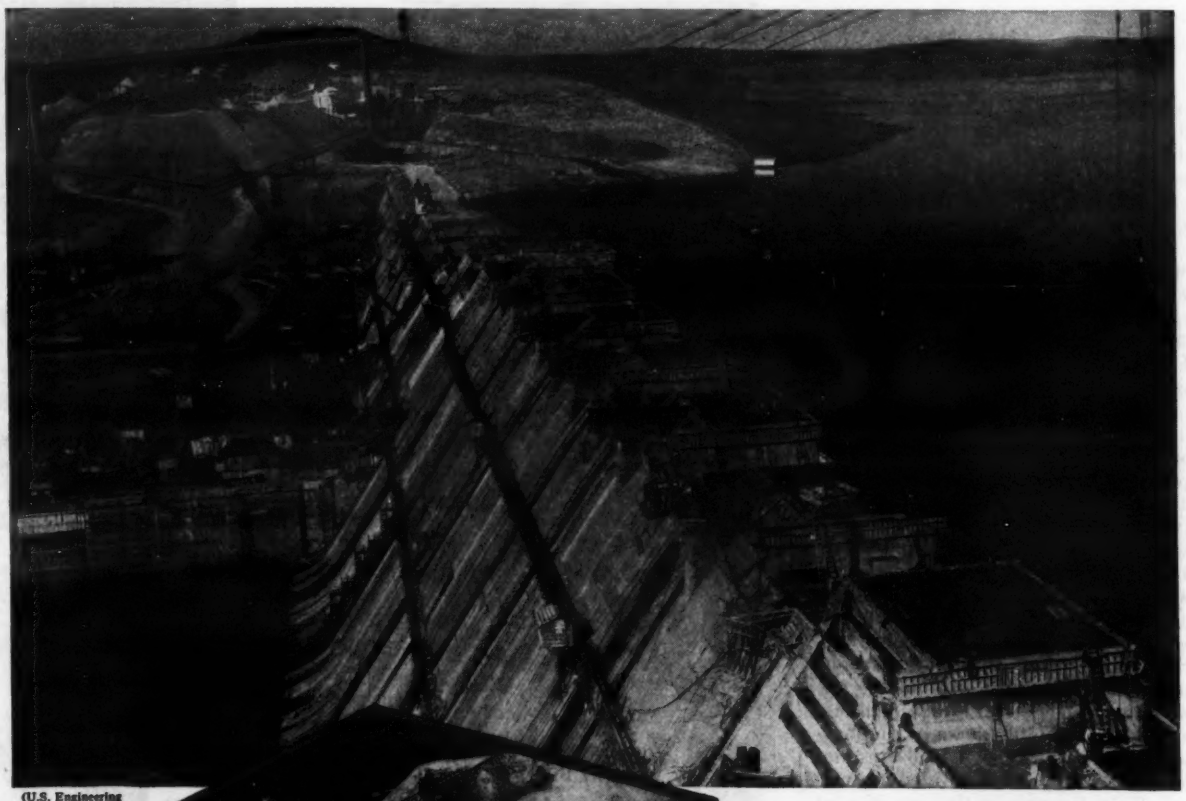

(U.S. Engineering Dept. Photo)

Close-up of combination gravel and quarry plant outlined above

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On the North Fork River, near Norfolk, Arkansas, the huge Norfork Dam nears completion. For its 1,500,000 cu. yds. of concrete, Telsmith engineers designed an aggregate plant that produces 500 tons an hour. Sand and gravel come from the White River; limestone from a nearby quarry. Two correlated processing systems are used . . . producing four sizes of coarse aggregate, sand and limestone dust. Waste is held to a minimum. Telsmith plant-flexibility permits adding dust to sand when necessary. All plant machinery, except some conveyors and electrical equipment, is Telsmith-built. Its "very satisfactory" performance helped expedite concrete placement for Morrison-Knudsen Co. and Utah Construction Co., the general contractors. *Get Telsmith Complete Plant Bulletin EP-34.*

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Cleaning rust and scale from the steel surfaces of the San Francisco-Oakland Bay Bridge preparatory to painting, using an Osborn wire brush in a power-driven tool.

Power Brush Scrapes, Cleans Steel Bridge

The practically continuous job of conditioning the acres of steel surface of the 7-mile-long San Francisco-Oakland Bay Bridge for the application of protective paint is carried on by fifteen or twenty men equipped with power brushes, reports the Osborn Manufacturing Co., maker of the portable-tool-driven steel-bristled power brushing units employed on this job. The brush part of the unit is cup-shaped, approximately 3¼ inches in diameter, heavily filled with coarse 0.020 S. A. wires which extend 15/16 inch out of the cup. It operates in and is driven by a portable hand tool which spins the brush at 4,200 revolutions per minute. The contact of the rapidly-rotating coarse wires with the structural steel surface speedily brushes away scale, spray-deposited salt and old paint, and leaves sound clean metal for the application of the new protective coat.

Further information about this power-brushing unit may be secured by writing direct the Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland, Ohio, and referring to this publication.

New Generators

The new Katolight revolving field generators recently announced by the Kato Engineering Co., Mankato, Minn., are built in 5, 10, 15 and 25-kw sizes, of 1,800 rpm, and in 5, 10 and 15-kw sizes of 1,200 rpm. These generators can be furnished as independent two-bearing units suitable for belt or coupling drive or as single-bearing units designed to fit standard SAE engine bell housings. The manufacturer states that they are conservatively rated, and will carry a 25 per cent overload without exceeding the allowable temperature rise. Voltage regulation is approximately 10 per cent with two-cycle speed change.

The frames are of high-grade gray iron with legs cast integral with the frame. Lifting rings are provided in all sizes to facilitate handling. The brushes are of ample capacity and long wearing, and the brush holders of the adjustable type to assure correct spring tension and alignment. They are also easily accessible for adjustment and repair.

Further information on this new line of generators may be secured by those interested direct from the manufacturer by referring to CONTRACTORS AND ENGINEERS MONTHLY.

You can't work with prima donnas . . . .

A welding and cutting outfit which fails in an emergency is too great a luxury to own. Sure, VICTOR costs a little more to buy...but it costs so much less to own.

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CUMMER
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EIGHT SIZES
Up to 1000 Tons per day
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50 Years' Experience

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PORTABLE
GASOLINE HAMMER

Manpower shortages call for mechanical short-cuts. Whether yours is a special or a regulation hammer job, Barco Portable Gasoline Hammers will enable you to get more work done with fewer hands required to do it. They're efficient, low in operating cost, and adaptable to almost any conditions. For full information address The Barco Manufacturing Company, Not Inc., 1818 Winnemac Avenue, Chicago 40, Illinois.

In Canada: The Holden Co., Ltd., Montreal, Canada

Open Area Paved For Army Storage

Concrete Access Roads and Disintegrated-Granite Base With Asphaltic-Concrete Top Makes Wasted Area Usable

✦ A CONTRACT awarded to Bonadiman & McCain, Inc., of Los Angeles, Calif., for base stabilization and the construction of asphaltic-concrete pavement on a disintegrated-granite base, with concrete access roads and perimeter drives, has enabled the Army to utilize for storage space which was formerly wasted. The area improved, lying on both sides of a street, covers approximately 9 acres which, because of the average low elevation of the area, has been too unstable for utilization as a parking space. Access roads of portland-cement concrete 22 feet wide were constructed at right angles to the street, with additional perimeter roads connecting their ends. The 70-foot-wide spaces between access roads was surfaced with 2 inches of plant-mixed asphaltic concrete placed on a disintegrated-granite base of 6-inch compacted thickness.

The subgrade was constructed of sand from a pit approximately 3½ miles away. There it was loaded by a ¾-cubic-yard Erie steam shovel into various makes of 5-cubic-yard-capacity trucks, varying in number with their availability but averaging ten. In the more stable locations a sand fill of 8 inches was sufficient but in several mucky areas the muck was pushed out by a Caterpillar D6 tractor with a LeTourneau bulldozer and the hole backfilled with the imported sand spread by the same unit. A 12-cubic-yard LeTourneau scraper pulled by a Caterpillar D8 was used to dispose of the excess muck pushed out by the bulldozer as well as for other items of grading incident to the work.

Access Roads

The 8 x 9-inch Madsen steel forms for the access roads were set by a crew of four men, with wooden forms of 1 x 8 for the inside and 2 x 8 for the outside being used on the curved portions of the perimeter roads. Wooden 2 x 4 stakes set at 3-foot centers held the curved forms in position.

Fine grading of the 2-inch valley gutter section, having a 6-inch center thickness with the outer 3 feet thickened to 9 inches, was done by a crew of seven men using hand shovels and grading below strings stretched from stakes in the center to the side forms. Rolling was done by a 10-ton Galion gasoline tandem roller.

The 5-sack batches for the concrete were proportioned at the Wilmington plant of the Consolidated Rock Products Co., and delivered by that company to the 27-E Rex paver. Cement, shipped in by rail and stored in cloth sacks adjacent to the scene of the work, was dumped on top of the batches by six men before the batches reached the paver, which operated in the lane being paved. Water for mixing was provided by a 2-inch pipe line connected directly to city water mains.

A crew of nine men spread the concrete with shovels and set the ¾-inch premoulded expansion joints at 90-foot intervals while two men operating a heavy wooden hand tamp spanning the pavement from the side forms shaped and consolidated the surface. Long-handled floats were used by two men who also did the final finishing by dragging burlap sacks over the surface of the pavement, after three men had cut the dummy joints 1½ inches deep at 15-foot intervals and edged the expansion joints. A crew of six men pulled the forms and attended to the application of the Hunt Process curing compound sprayed on from drums carried on a flat-bed Chevrolet truck which was also used to transfer the forms.

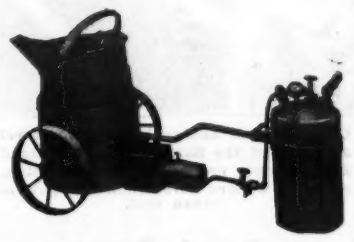
The contractor had a Hobart arc welder on the job for repairs to any disabled equipment.

(*Concluded on page 69*)

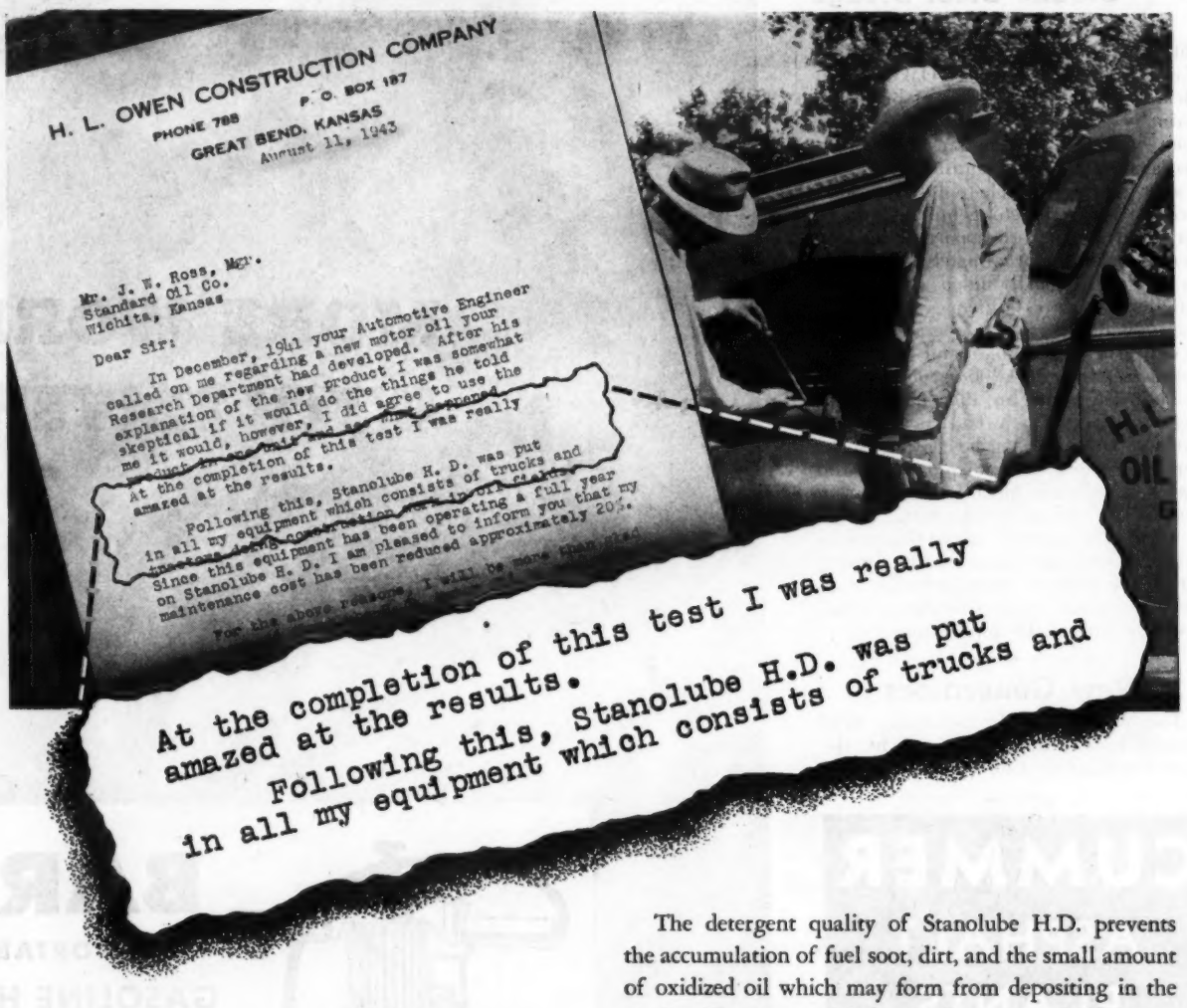
CONNERY'S HEATING KETTLES

Speed up work by using a Connery Heating Kettle for building and maintaining highways, airports, barracks and roads. Made in sizes of 30, 80, 110 and 165 gallons.

Send today for our complete catalog showing our full line of Tar and Asphalt Heating Kettles, Spraying Attachments, Pouring Pots, etc.



CONNERY CONSTRUCTION CO.
4000 N. Second St. Philadelphia 40, Pa.


H. L. OWEN CONSTRUCTION COMPANY
PHONE 788 P. O. BOX 187
GREAT BEND, KANSAS
August 11, 1943
Mr. J. W. Ross, Mgr.
Standard Oil Co.
Wichita, Kansas
Dear Sir:
In December, 1941 your Automotive Engineer called on me regarding a new motor oil your Research Department had developed. After his explanation of the new product I was somewhat skeptical if it would do the things he told me it would, however, I did agree to use the product in one unit and so that happened.
At the completion of this test I was really amazed at the results.
Following this, Stanolube H. D. was put in all my equipment which consists of trucks and
Since this equipment has been operating a full year on Stanolube H. D. I am pleased to inform you that my maintenance cost has been reduced approximately 20%.
For the above reasons I will be more than pleased
At the completion of this test I was really amazed at the results.
Following this, Stanolube H.D. was put in all my equipment which consists of trucks and

• IN TEST AFTER TEST, by fleet owners themselves, Stanolube H.D. works out just as H. L. Owen of Great Bend, Kansas, describes in his letter.

First, operators find it hard to believe that Stanolube H.D. will keep engines as clean as claimed for it. So they test it in one unit. Then, seeing the results, they put it in all equipment. And, sooner or later, they report a substantial saving in engine maintenance.

Here's why Stanolube H. D. keeps engines cleaner

Stanolube H.D. is a heat-proofed oil. That is, it is inhibited against oxidation. It reduces to a minimum troublesome types of deposits—varnish and oxidation sludge.

The detergent quality of Stanolube H.D. prevents the accumulation of fuel soot, dirt, and the small amount of oxidized oil which may form from depositing in the engine. These potential deposit formers are held in suspension in the oil until they are removed by draining.

Test Stanolube H.D. in one of your hard-worked pieces of fleet equipment. Ask the Standard Oil Man who calls on you for results of similar tests in fleets near you. For more information about Stanolube H.D., call in a Standard Automotive Engineer. Write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

★ *heat-proofed* **Stanolube H. D.** ★

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We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

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Multiple-Blade Maintainer For Low-Cost Highway Work

A versatile multiple-blade road maintainer, providing 40 feet of blade cutting edge, is described and illustrated in a folder issued by the manufacturer, the W. A. Riddell Corp., Bucyrus, Ohio. The Warco 35, which can be secured with 10 or 12-inch blades instead of the usual 8-inch size if desired, and with or without an independently adjustable rear blade, is reported to work efficiently on gravel, sand, clay, earth or stone, as the independent suspension of the dragging member permits adjustment to meet a wide variety of conditions. General specifications are included in the catalog, and an outline of the various adjustments possible with this piece of equipment.

Interested highway engineers and contractors may secure copies of the catalog by writing directly to the manufacturer and mentioning this item.

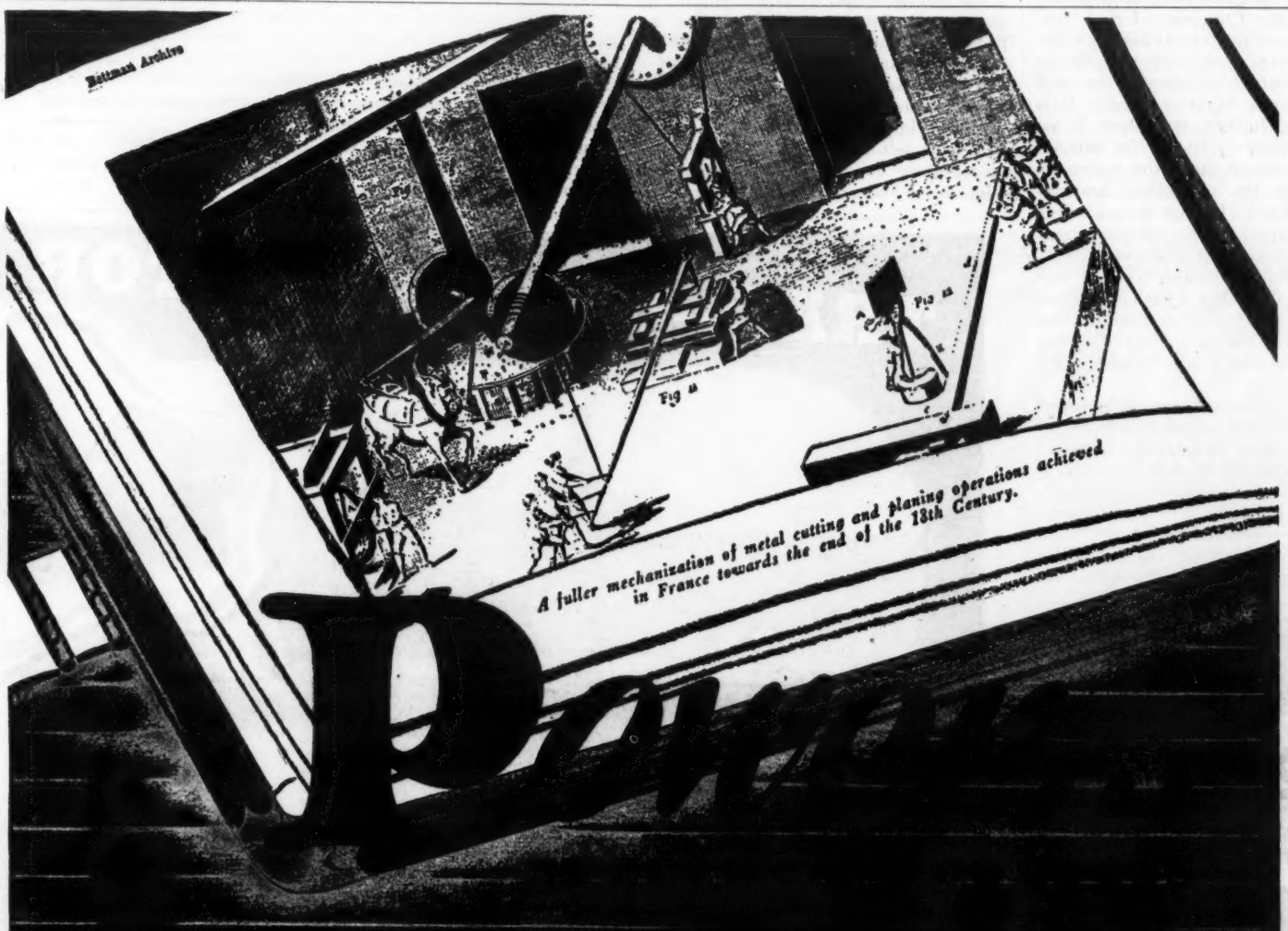
Highway Dept. Sponsors Driver Training Courses

Instructions in driver training, to prepare teachers for giving high-school courses in motor-vehicle operation, were a feature of the Teacher Training Institute held at Ohio State University June 14, 15 and 16. Subjects covered in the three-day term of lectures and discussions included driver testing, motor-vehicle construction and operation, road and behind-the-wheel training, convoy training and map reading, as well as teaching methods and aids.

This project, which aims to place driver training on high-school curriculums along with the regular courses, is sponsored by H. G. Sours, Director of the Ohio Department of Highways, who has cooperated with the State Department of Education in promoting the value of civilian-driving education as a means of reducing traffic accidents on streets and highways.

Bell Joins Distributor As General Sales Manager

Announcement has been made by the Connelly Machinery Co., Billings, Montana, distributor for Caterpillar tractors, road machinery and engines, of the appointment of G. A. W. Bell, Jr., as General Sales Manager. For several years past Mr. Bell has served with the Caterpillar Tractor Co. as Manager of Sales to Railroads, Promotional Sales Representative to the construction, mining and logging trades, and since 1938 as District Representative for Colorado, Wyoming, Nebraska and Kansas, with headquarters at Denver.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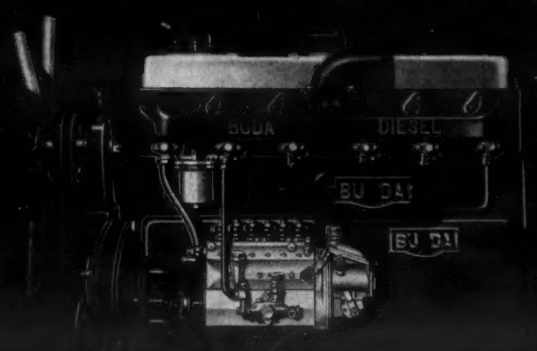
A fuller mechanization of metal cutting and planing operations achieved in France towards the end of the 18th Century.

Crude machines devised for surface grinding and cutting metals were considered the peak of progress in the 18th Century, but the progress since made in Diesel engines far surpasses the fondest dreams of early inventors and engineers.

Today you can have the finest, most efficient, economical power ever developed by using BUDA Diesels.



ARMY E NAVY

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Service is Nation-wide

Write or wire for literature.

BUDA

New Federal-Aid Bill Fails to Meet Needs

(*Continued from page* 15)

Bill Is Inadequate

Filed with the Committee report was the individual statement of Congressman J. W. Mott of Oregon, long a member of the Committee. Congressman Mott declared in part:

"I shall support H. R. 4195 solely for the reason that it is essential that legislation providing for a post-war highway construction program be enacted at this session of the Congress. I feel constrained, however, to state here that the bill, as reported from committee, in my opinion, is wholly inadequate to meet proven post-war highway needs. It is my opinion, further, that there is no sufficient reason or excuse for this inadequacy, because the entire testimony presented at the committee hearings clearly disclosed (1) that the minimum amount required for an adequate post-war highway program would be $1,000,000,000 per year for three years; and (2) that the financing of such a program would be economically feasible and would not result in an undue tax burden on the people who are to benefit by the legislation. . . .

"Witness after witness admonished the committee that, unless a Federal-Aid program of such proportions is established, we will not be able to even approach post-war highway requirements and face a breakdown of the highway transportation system.

"Of equal importance was the wealth of testimony before the committee regarding the economic aspects of post-war construction. Witnesses representing the Federal Government, states, counties and cities, as well as the highway users, labor and industry warned the committee that unless we make adequate preparation now we face the return of the Work Projects Administration or even something worse in the post-war era. According to the testimony of these experts, the authorization of only $500,000,000 a year would be but a pitiful approach to a problem of tremendous proportions.

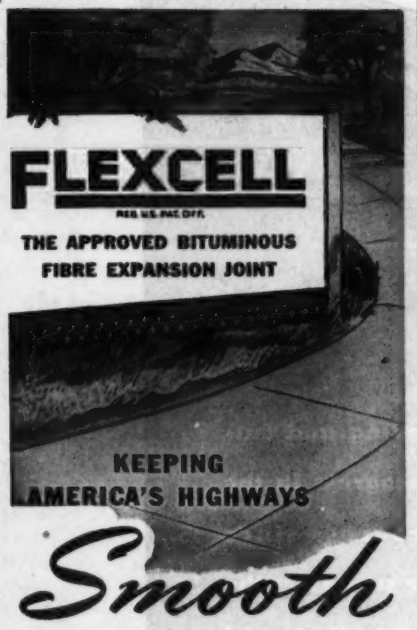
"Much has been said regarding the size of the national debt as contrasted with the favorable financial conditions of the several states. In this connection, however, it may be pointed out that a Federal-Aid authorization of $1,000,000,000 a year for each of the three post-war years would have very little, if any, effect on the size of the national debt. Highway improvements may be truly classed as self-liquidating projects and, according to competent authorities, receipts from Federal excise taxes during the post-war period will be sufficient to meet the expenses of a program twice the size of the one contemplated under H. R. 4915. In fact, the amount provided in H. R. 4915 would not even equal the annual rate of Federal collections from highway users based on the 1942 level. For the fiscal year 1942, the receipts from Federal excise taxes on motor vehicles, gasoline, oil, etc., totaled $626,327,000 which is over $126,000,000 more than the annual amounts authorized in the bill under consideration. There is no question but that the number of vehicles and vehicle use will increase substantially following the war. This, of course, means substantially increased returns to the Federal government from the various taxes now levied on motor vehicles and motor-vehicle use."

A serious weakness of the bill, according to the American Road Builders' Association, is the failure to utilize the engineering facilities of county and city highway departments. No provision is made for counties or cities to serve in more than an advisory capacity; they cannot supervise construction or in any way directly handle or control projects involving Federal-Aid.

"There are hundreds of city and county highway departments which are staffed by competent engineers," Mr. Upham commented. "The job ahead is so great it would be extremely short-sighted to eliminate local road agencies. To adequately meet the demands of post-war traffic, to get a spread of employment, and to best serve local needs, every capable highway agency must be called into action.

"In this connection, the bill confines funds for urban construction to the Federal-Aid system. That is unfortunate since in many cities relief arteries are needed which parallel existing Federal routes. In many cases, connections to the Federal routes are as important as the routes themselves."

Gasoline and oil are powerful weapons of war and are vital to victory. Use yours wisely.



● FLEXCELL, made of long Celotex springy fibres, is the *approved* modern expansion joint for all highway and general concrete slab construction.

● Keeps highways smoother because it never extrudes. Compresses under pressure. Springs back when the expansion pressure is eased. Can be set flush—or set below the slab surface with poured capping.

● It's light, easy to handle. Helps make concrete roads last longer. Proved by years of service on American roads—with "never a bump in a million miles."

Write for sample and complete information.

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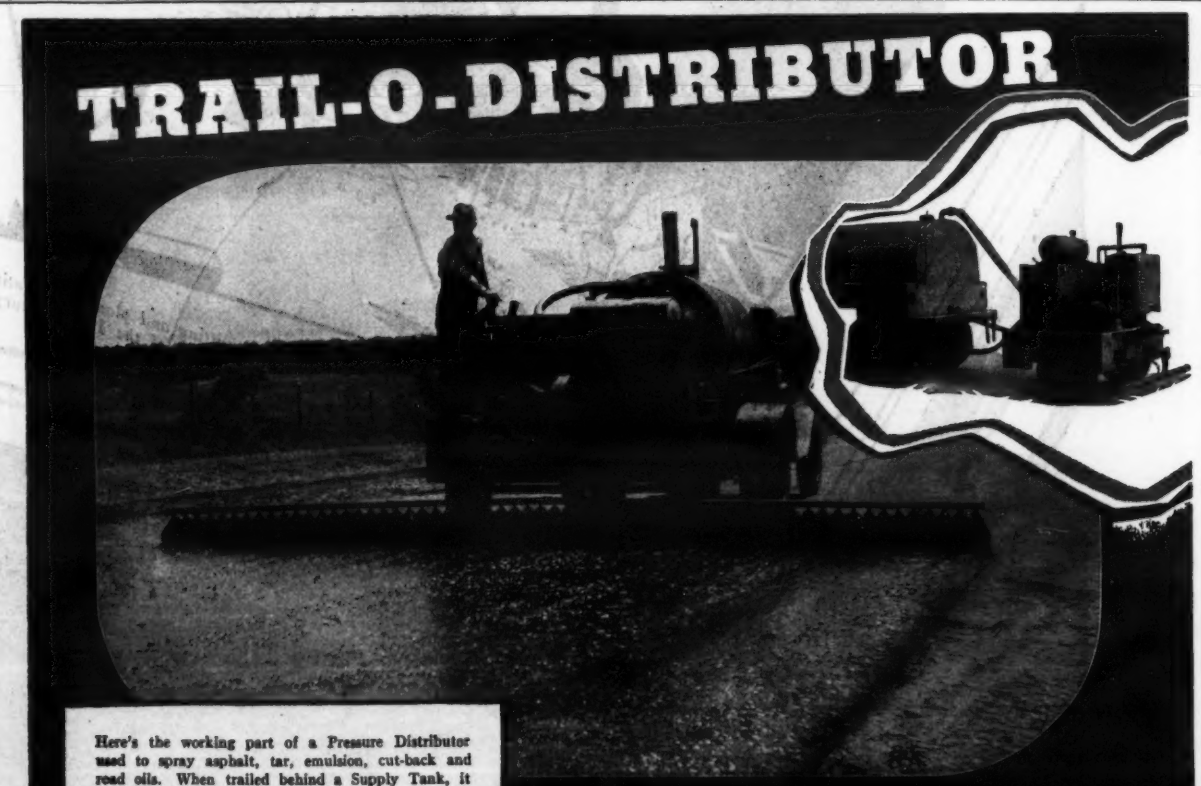
World's Largest Manufacturers of
BITUMINOUS FIBRE EXPANSION JOINT



Here's the working part of a Pressure Distributor used to spray asphalt, tar, emulsion, cut-back and road oils. When trailed behind a Supply Tank, it functions just like a Distributor.

When on long hauls from material supply to the job, a Trail-O-Distributor trailed behind a large Supply Tank is the most efficient method of spraying. Trail-O-Distributor is highly portable, mounted on a special running gear with elliptical springs, pneumatic tires, and adjustable for pulling tongue for hooking on Supply Tank.

If the Supply Tank has heating arrangement, the Trail-O-Distributor can be supplied with circulating arrangement which adds greatly to the heating of the material by agitating while hauling.

For a highly efficient spraying unit, the Trail-O-Distributor supplied by a Supply Tank is the most modern unit made today.

Littleford Bros., Inc.
485 E. Pearl St., Cincinnati 2, Ohio

LB LITTLEFORD
BLACK TOP ROAD MAINTENANCE EQUIPMENT
SINCE 1900

A General Supercrane helps to speed invasion preparations at a British port.

Supercranes Active On Invasion Front

The wide use of General Supercranes in Great Britain and at other centers supplying the invasion forces has so increased the demand for this equipment that the General Excavator Co., of Marion, Ohio, has enlisted the facilities of Philips & Davies, Inc., Kenton, Ohio, in order to increase the output. The entire production is earmarked for the Army.

Supercranes going into the war effort have all the features of regular models, and in addition are equipped with a new independent boom hoist which, the manufacturer states, assures faster operation and increased lifting capacity. Furthermore, the simplified operation by a single lever is regarded as an important advantage for men who may never before have operated a crane.

"Philips & Davies, Inc., are licensed to build Supercranes only for the duration", Don B. Smith, Sales Manager of General Excavator, said in announcing the arrangement. "After Victory they will not continue in the crane business but plan to resume production of water-control equipment. Their willingness to by-pass regular products and help with Supercranes is appreciated by everyone using Supercranes on the home and fighting fronts."

Truckstell Incorporates To Provide Wider Service

The incorporation at Cleveland, Ohio, of the Truckstell Mfg. Co., a stockholder distributor organization consisting of approximately forty national distributors of truck equipment, Donald W. Meyer and Milton W. Anderson, founders of the company, and other nationally known transportation experts, was planned to coordinate, amplify and intensify their activities as distributors of truck equipment and converters of trucks for expanded usefulness.

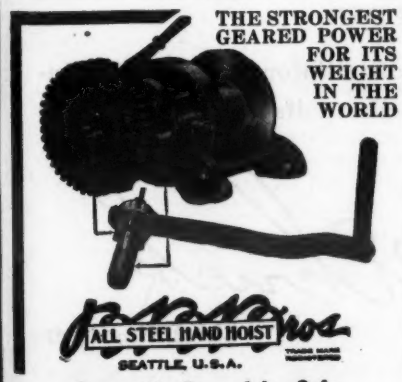
Plans have been made for the development and manufacture of new equipment and for expansion of facilities to handle additional lines of manufacturers needing the services of such a national distributor organization. The present lines handled include Eaton two-speed axles, Thornton four-rear-wheel tandem drives, Thornton automatic locking differentials, Truxmore third axles, Clark heavy-duty axles, Clark booster-engine conversions, Clark heavy-duty cast wheels, Watson auxiliary transmissions, and Champion safety gas tanks.

Originally identified with the distribution of Ruckstell two-speed axles, Don Meyer and Milton Anderson expanded the idea of converting various makes of 1½-ton trucks into engineered units with standardized characteristics through the installation of various types of approved heavy-duty equipment. This idea was widely accepted and thousands of Truckstell conversions have been sold through a nation-wide organization of distributors.

Donald W. Meyer is President of the newly incorporated company and J. D. Maynard of Detroit, C. A. Bieber of Cleveland, and Walter Blaul of Chicago are Vice Presidents directing the various committees. F. J. Hessler of Cleveland is Secretary-Treasurer, and Milton W. Anderson is Chairman of the Board.

Goodyear Los Angeles Plant Expands Products

The Los Angeles plant of Goodyear Tire & Rubber Co., whose principal product is tires, has been expanded to include the production of hose and other mechanical rubber goods, according to a recent announcement. One of the first products of this plant was a length of rubber suction hose of special synthetic rubber construction for use in the recently-opened synthetic-rubber plant which Goodyear is operating for the Rubber Reserve Corp. in Los Angeles. It is also announced that the Los Angeles plant of Goodyear will eventually produce a wide variety of molded rubber articles in addition to hose and industrial equipment.



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Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

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Inventive genius.... Production skill. ... Business enterprise—This is America! ★ Improving today's products. . . . Anticipating tomorrow's requirements.... Meeting every challenge and opportunity—This is Raybestos! ★ A basic American industry, Raybestos keeps pace with American progress, and leads in producing advanced brake linings and clutch facings for the four great fields—Automotive, Heavy Duty, Industrial and Aircraft. ★ Out of this leadership and Raybestos production for war, are now coming friction materials of still greater quality and performance for you. Count on Raybestos.

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FRICTIONEERS to AMERICA

Manufacturing the most complete line of highest quality metallic and non-metallic brake linings and clutch facings for every type of equipment, war and civilian. Also fan belts and hose.

Street in Texas Town Repaved With Hot-Mix

(*Continued from page 2*)

Ady plant of the Texas Sand & Gravel Co. to the plant site in two sizes, one from ⅝ to ¼ inch and the other minus ¼-inch material, and were unloaded to stockpiles by a Northwest crane with a ¾-cubic-yard Owen clamshell bucket, which fed the 50-ton 4-compartment steel bins set up by the stockpiles. A 24-inch-diameter rotary steel drum set under this bin fed the aggregates to the cold elevator, proper proportioning being obtained by the adjustment of sliding gates above the drum. A Caterpillar Thirty-Five tractor with a LeTourneau bulldozer was used around the plant site for moving cars and stockpiled material.

Due to the uncertainty of shipments, storage for 36,000 gallons of asphaltic cement was provided at the plant site. A Cleaver-Brooks tank-car heater was available for standby use in addition to the 85-hp horizontal boiler ordinarily used for heating asphalt and blowing the oil-fired Simplicity drier which, with the cold elevator, were powered by a Caterpillar D8800 diesel engine.

The asphalt plant was assembled by the ingenious contractor from parts of both Simplicity and Madsen plants, with numerous additions which he had designed and fabricated. An International diesel engine was used to power the dust collector, while the hot elevator, pugmill and shaker screens were driven by a larger Caterpillar D13000 diesel engine. After being screened into three sizes, the aggregates were weighed by a Howe springless dial scale and mixed in a 3,000-pound Madsen pugmill.

Hauling and Placing

Four to six trucks hauling four 2,500-pound batches per truck delivered the mixed asphaltic concrete to the street where it was spread by an Adnun Black-Top Paver in 10 and 11-foot widths at a rate of 150 pounds per square yard. Since the improvement varied from 40 to 66 feet in width and it was desired to complete the full width each day, it was necessary to adjust the width of the lane during placing as conditions demanded. Rolling was done by a Buffalo-Springfield 8-ton tandem roller which had been converted by the contractor from steam to gasoline power, being equipped with a Ford V-8 engine, and by a Galion 10-ton gasoline-powered roller.

The street crew consisted of an operator for the Adnun machine, two dumpers, two rakers, two stringmen and two roller men, and the average production was 700 tons per 10-hour day.

Major Quantities

The project was 1.666 miles in length, varying in width from 40 to 66 feet, and the major bid quantities included the following:

Tack coat	5,000 gals.
Asphalt (120 to 150-penetration)	250 tons
Aggregate (Type D. Mod.)	4,500 tons

The grading specifications for the Type D. Mod. aggregates follow:

Passing ⅝ inch	100 per cent
Passing ½ inch	97-100 per cent
Passing ½ inch; retained ¼ inch	25-45 per cent
Passing ¼ inch; retained No. 10	15-35 per cent
Total retained on No. 10	50-65 per cent
Passing No. 10; retained No. 40	0-20 per cent
Passing No. 40; retained No. 80	5-25 per cent
Passing No. 80; retained No. 200	8-25 per cent
Passing No. 200	2-10 per cent

The Public Construction Co.'s hot-mix plant at Borger, Texas.

Asphaltic cement varied from 5 to 7 per cent by weight of the mixture, and mixing temperatures ranged from 200 to 300 degrees.

Personnel

The contract for this work was awarded in November, 1943, but inclement weather caused the suspension of operations on December 9, which were not resumed until April 17. The job was completed on May 8, 1944. The Public Construction Co. of Denton, Texas, with Walker Jagoe as managing partner, was awarded the contract on the low bid of $33,650. Lee Cartwright was Superintendent for the contractor, and H. W. Schmidt was Resident Engineer in charge of this particular job for the Amarillo District, Texas Highway Department, James G. Lott, District Engineer.

New Rodgers Plant Supt.

Rodgers Hydraulic Inc., Minneapolis, Minn., manufacturer of hydraulic presses and the Rodgers track press for servicing crawler-type tractors, has announced the appointment of Clarence W. Pearson as Plant Superintendent. Mr. Pearson was formerly connected with the Twin Cities Ordnance Plant as General Superintendent of the 30-calibre Ammunition Department.

The company is planning on marketing several new post-war products of vital interest to engineers and contractors. Details of the new Rodgers hydraulic presses will be available later.

ENGINEERED

TO THE TREMENDOUS JOB AHEAD

With more than $7,000,000,000 worth of new roads already anticipated as a part of the Nation's road building program immediately after the war, not including maintenance, road machinery will face the biggest test of its career. Standards of performance accepted in the past will not serve the postwar era. These standards must be re-established on a much higher plane of speed, power and dependability.

To meet this challenge HUBER'S Engineers have mustered all of the knowledge, experience and skill at their command. They have cast off tradition-bound practices and "set their sights" on the new future. The results have been amazing.

Today HUBER is "all set" to help the Nation's Road Builders "lick" the tremendous job that lies ahead. It has designed and developed the finest and most complete line of ROAD MACHINERY ever offered to the trade by a single company, with each piece of machinery, rollers, maintainer, bulldozer, sweeper, mower and snow plow, incorporating many new and desirable features. A number of these new features are exclusive to HUBER.

Huber invites distributors to write for interesting facts about its new sales policy and franchise.

H. C. Ehrick

Chief Engineer

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity

** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIPT. CO.

LA CROSSE, WISCONSIN U. S. A.

Pneumatic Tool Co. Has 50th Anniversary

The Cleveland Pneumatic Tool Co., of Cleveland, Ohio, maker of pneumatic tools, rock drills and other construction machinery, celebrated its fiftieth anniversary last month. Incorporated in 1894 under the name of the Union Electric Co., the company was first organized for the manufacture and sale of electric appliances. With the concentration of operations on the development and production of pneumatic appliances, the name was changed to the present one in 1899, and in 1908 the organization of two subsidiaries, the Cleveland Rock Drill Co. and the Canadian Cleveland Drill Co., Ltd., later known as the Cleveland Pneumatic Tool Co. of Canada, Ltd., marked a new stage of progress.

During its early years, company policies were directed by Claus Greve, President, who was succeeded by his son, the late L. W. Greve.

New D-C Motor Controls Featured in Bulletin

A four-page two-color bulletin just issued describes the new Weltronic electronic adjustable-speed motor drives which operate any dc shunt-wound ½ to 15 hp motors, from an ac power supply, for driving lathes, grinders, drill presses, conveyors, winches and similar equipment. According to the bulletin, precise control is obtained by a simple push button and dial control station located conveniently near the driver, and additional features stressed are adaptability, simplicity of operation, low initial cost and maintenance, ease of installation, and full protection against short circuiting, field loss, power-supply failure and overloading. The bulletin also contains a detailed description and schematic diagram showing the operation of the motor control, as well as complete specifications.

Copies of Bulletin No. WTM-44 may be secured upon request to the Weltronic Co., 19500 West Eight Mile Road, Detroit 19, Mich. Just mention this publication.

Casellini-Venable Corp. Named Caterpillar Dealer

Announcement has been made of the appointment of Casellini-Venable Corp., of Barre, Vermont, as distributor for the complete line of Caterpillar diesel engines, tractors and motor graders. The territory to be covered by the new dealer company, which has handled heavy machinery in the area for the past twelve years, includes all of Vermont with the exception of one county, and the state of New Hampshire except two counties.

MODERN MATERIAL MOVERS...

to save you time and money!

ATHEY MOBILOADER

ATHEY FORCE-FEED LOADER

Left, an Athey MobiLoader loads from stockpile into truck in Alabama. Force-Feed Loader at right picks up and loads material on road widening job in Maryland.

Manpower is today's big problem. Men are scarce and time-saving equipment comes more and more into popularity. Athey loading equipment is stepping up loading production with less manpower, thus, it's filling a vital wartime need.

The Athey MobiLoader cuts minutes from loading time because it backs up and unloads material overhead, saves tractor turning. Keeps costs low, too, through the economy of the "Caterpillar" Diesel Tractor. It handles the widest variety of materials.

The self-propelled Athey Force-Feed Loader is another man and time saver. It's a companion tool for the Motor Grader. Loads surplus materials cheaper, faster and cleaner than ever before. Works on highway maintenance and construction.

Why not check further into these modern loading machines? Write your Athey-"Caterpillar" Dealer, or direct to Athey Truss Wheel Co., 5631 W. 65th Street, Chicago, 38, Ill.

Athey

. . . for Hauling and Loading Equipment

Official U. S. Army Signal Corps Photo

Nazi demolition experts who sank numerous ships in the harbor of Naples failed to take into account the ingenuity of the U. S. Engineers. Here, they outwitted the enemy and turned a deficit into an asset by transforming an overturned ship into a pier. The ship's superstructure digging into the harbor bottom steadies the hull, up which a ramp was built and a line of trucks drives to pick up cargo from a Liberty ship.

WPB Releases Data On Equipment Shipped

In the interests of business analysis and planning, the War Production Board has released comparative data on shipments of various types of construction equipment during the past several years, which may be useful in estimating future demand and output.

The total number of power cranes and shovels shipped in 1943 was 7,218, more than double 1937 shipments, the earliest year for which comparable figures are available, and nearly 45 per cent more than the 1941 figure. It is estimated that approximately 75 per cent of the 1943 production of this type of equipment consisted of crawler cranes and shovels, whereas during the period 1937-41 they accounted for nearly 90 per cent of the total production, a difference which may be accounted for by the fact that there is an increasing demand for the truck-mounted type. Unfilled orders at the end of 1943 totaled 7,963, which was slightly more than one year's production at the present rate.

The following table gives shipping figures for both crawler and truck-mounted types during the period 1937-43 inclusive:

Year and Quarter		Crawler Mounted	Truck Mounted	Total
1937	Total	2,974	312	3,286
1938	"	2,260	213	2,473
1939	"	2,503	243	2,746
1940	"	3,216	378	3,594
1941	"	4,191	835	5,026
1943	"	5,291	1,937	7,218
1943	1st	1,167	370	1,537
	2nd	1,238	485	1,723
	3rd	1,431	497	1,928
	4th	1,455	575	2,030

Hauling scrapers of over 2-cubic-yards capacity shipped during 1943 totaled 5,054, a slight increase over 1941 shipments. It is reported that approximately all scrapers manufactured are being purchased by the military agencies. Yearly shipment figures are:

Year and Quarter		Shipments
1937	Total	967
1938	"	1,484
1939	"	2,353
1940	"	3,377
1941	"	5,043
1943	"	5,054
1943	1st	1,351
	2nd	1,497
	3rd	1,511
	4th	695

During 1943, a total of 246 pavers were shipped, composed 55 per cent of bituminous pavers and 45 per cent concrete pavers, slightly less than the yearly average shipped during the pre-war period 1937-41. Defense construction brought 1941 shipments up to 417, the largest yearly figure on record. The numbers of pavers shipped each year during the period 1937 to 1943 are:

Year	Shipments
1937	257
1938	169
1939	181
1940	257
1941	417
1943	246

Road rollers shipped in 1943 amounted to 2,850, nearly triple 1937 shipments. Plant expansion, it is reported, resulted in the manufacture of more rollers during the fourth quarter of 1943 than in any previous quarter, although at that time plants were operating at only 60 per cent of current capacity. Unfilled orders at the end of 1943 equalled about six months' production at present capacity levels. Yearly shipment figures, which cover three-wheel, tandem, pneumatic-tired, trench and portable types of road rollers, but exclude tamping or sheepsfoot rollers, are:

Year and Quarter		Shipments	Unfilled Orders (End of Quarter)
1937	Total	997	....
1938	"	1,063	....
1939	"	1,022	....
1940	"	1,317	....
1941	"	2,716	....
1943	"	2,850	....
1943	1st	513	2,016
	2nd	770	1,954
	3rd	724	2,824
	4th	843	2,302

The foregoing figures are based on reports representing 100 per cent of the industry.

STILL GIVING YOU

Long LIFE AND *Sure* LIFT!

To the Man Who Needs a Jack:

There are several *new* reasons why it pays to select a Blackhawk Jack today . . . or to wait for a Blackhawk's arrival, even though a less popular brand should happen to be available.

Here are the reasons:

With war limitations on certain critical materials, Blackhawk continues its great care in selecting the highest quality material available. And then, to make doubly sure that quality will be maintained . . . Blackhawk enforces even more rigid inspection of jacks than in peacetime.

Since a jack is valueless unless it continues to perform in every emergency . . . Blackhawk deliberately assumes increased manufacturing costs to assure a top quality product for you.

So—today, as in peacetime—when you need a jack—buy the best—buy Blackhawk—from your jobber.

A Product of BLACKHAWK MFG. CO., Dept. J1874, Milwaukee 1, Wis.

DEPENDABILITY Service Proved PERFORMANCE

This seal is found ONLY on BLACKHAWK HYDRAULIC JACKS—your assurance of a wise and safe investment.

BLACKHAWK

Certified means each tested.

• The Carver "Certified" Tag means that the pump carrying it will stand up under tough assignments. It means that your Carver has been proved satisfactory both in the laboratory and on the job. It guarantees that the pump will go to work at once and keep on working at high efficiency.

Look for a Carver when you want rugged performance on road jobs. Write today for catalog, prices, deliveries, and name of dealer in your territory. No obligation, of course.

. . . the Road Contractor's Pump

THE CARVER PUMP CO.

MUSCATINE, IOWA

CARVER CENTRIFUGAL Certified

Rock-Salt Treatment For Secondary Roads

Wartime Maintenance of New York Township Roads Aided by Stabilization With Salt

(*Photo on page 84*)

✦ DISCUSSION of vast arterial highway systems to be incorporated in a post-war public works program has focussed the attention of the public on the super-highway, to the neglect of the less glamorous but equally essential network of secondary roads for which county and town highway superintendents are responsible. This transportation system carries much of our food, and over it move almost half of all the motor trucks registered in the United States.

Rock salt as a soil stabilizer is enabling many superintendents of highways to overcome wartime problems of labor shortages and reduced budgets, and still build and maintain excellent secondary roads. Good country roads are more important than ever today because they not only permit reasonable speed with safety, but conserve tires and prolong the life of farm cars and trucks. The need for increased production of food has boosted the volume of traffic on many farm-to-market roads, while the number of tourists and non-essential drivers on the arterial highways has declined sharply. It is therefore just as important to provide adequate maintenance protection to the rural avenues of commerce for the transportation of farm personnel, equipment and produce, as it is to insure good primary highways for the movement of war supplies by motor truck and the conveyance of war workers. Today, because of the dispersal of war plants, munitions are being made on acres which a few years ago may have produced corn and turnips, and many rural roads have been transformed suddenly into busy thoroughfares. The flow of traffic has been augmented in many areas by the necessity of ferrying volunteer help and transient labor to and from the depots.

Periodic reconditioning of secondary roads is necessary even in regions where there is little or no agriculture, and gas rationing has caused traffic to decline. The ravages of weather continue, war or no war, and the price of neglect for even a short time is ultimately higher maintenance costs. With all but a fraction of the rural population dependent upon cars, there has been greater interest in the proper maintenance of the routes they must use for their intercourse with the nearest community. Good roads have become the rule and, even in wartime, pot holes, washboard corrugations, stretches which are dusty in summer and muddy after rains are no longer tolerated as an inevitable condition of country life. As a consequence, the work of the county or town superintendent of highways has become more exacting.

It may, therefore, be helpful to know how rock salt as a soil-stabilizing agent has assisted Robert Jordan, who is responsible for the care of the roads in the Township of Elbridge, Onondaga County, New York, as reported to Louis J. Ettinger, Jr., Superintendent of Field Engineers, International Salt Co., Inc.

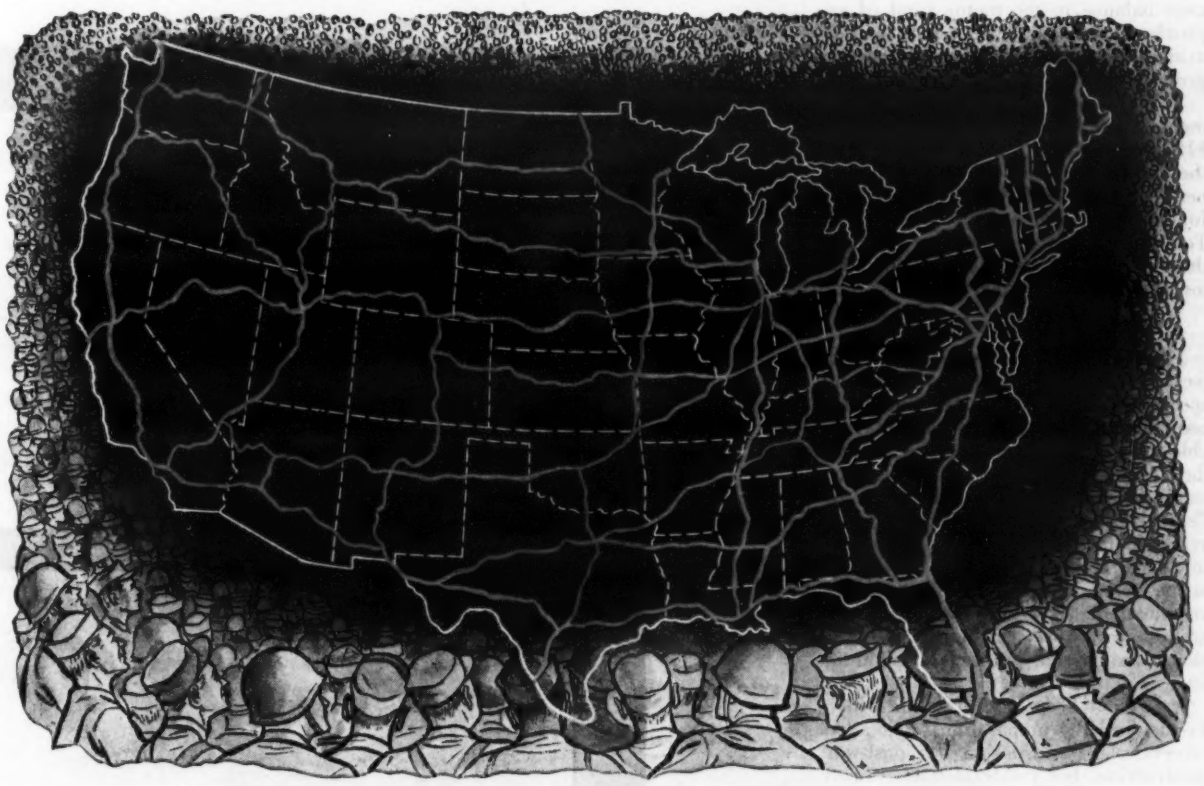
Work in Elbridge Township

Mr. Jordan said, "Since 1935 our work in progressively treating the entire mileage of roads in the township with rock salt has proved most satisfactory and is paying good dividends today. Each year, according to our program, about 5 miles of road are reconditioned with salt. We find that a salted road furnishes a very durable wearing course that winters in excellent shape.

"An initial application of about 8 tons to the mile for a 16-foot width of road provides at a low cost a hard top which retains the surface materials and prevents raveling. Less work and, therefore, less wear on equipment is required to maintain in good condition a road that has been stabilized with rock salt. One

(*Continued on page 66*)

A street in Fairmount, N. Y., maintained by the Camillus Township Highway Department, after soil stabilization with rock salt, presents a durable wearing surface free from dust.



PLANNED POSTWAR HIGHWAY PROGRAM MEANS

Quick Employment For 3 Million

No one wants another depression 13,000,000 people deep. It will be much better to measure the height of national prosperity by the number of people employed.

Since it is generally agreed that gainful employment is the No. 1 factor in the national economy, it is to every American's best interest to get behind and push forward every sound postwar plan. ***One such is that of the American Road Builders' Association.***

It is sound because it will quickly and directly employ 3,000,000 people on a planned highway building program sorely needed before the war and absolutely necessary postwar.

It is sound because it eliminates attempts to fill depressions with improvised work relief amply demonstrated to be slow, costly, inefficient, and demoralizing.

It is sound because it is based upon plans and specifications carefully prepared in advance, cost estimates made in advance by public engineers, bids made by competing contractors who are willing to back up their judgment with their own funds, and the requirement of ample bond to further guarantee the delivery of quality work at contract costs and on time.

It is sound because it makes more efficient use of on-site employment and affords far more off-site employment in the production of materials and equipment. Thus, in addition to stimulating the consumer goods market, it induces far reaching employment throughout the production, transportation, and service industries. Studies made by the U. S. Public Roads Administration indicate that the proposed investment of 3 billion dollars annually in highways eventually results in business transactions totaling 9½ billion dollars.

Every American who wants to get early enjoyment of a better planned highway system, constructed better at the lowest bid cost, should write for and read the 64-page book entitled "A Sound Plan For Postwar Roads and Jobs." Among other things it points out that nearly enough in motor vehicle taxes is normally collected to pay for this sound, planned program if used for the purpose intended.

WRITE FOR THIS FREE BOOK... E-44

Address
AMERICAN ROAD BUILDERS' ASSOCIATION, 1319 F Street, N.W., Washington 4, D.C.
OR
UNION WIRE ROPE CORPORATION, 2192 Manchester Ave., Kansas City 3, Missouri

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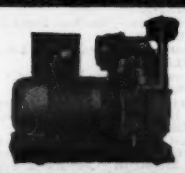
BUILD FOR DEFENSE with STERLING PUMPS HOISTS and LIGHT PLANTS



STERLING MACHINERY CORP.
405-13 Southwest Blvd. Kansas City, Mo.

Status of Planning For Penna. Highways

(*Continued from page* 10)

proximately $93,000,000 of state funds available per year. This would be divided as follows:

Interest and sinking fund on existing highway bond issues; issuance of license tags and drivers' licenses; collection costs, appropriations to state police and other state departments, etc.	$ 13,000,000
One-half-cent gasoline tax to counties and appropriations to townships of second class..	12,000,000
Available to Department of Highways.....	68,000,000
Total	$ 93,000,000

Of the $68,000,000 estimated available to the Department of Highways, $32,000,000 per year will be required to maintain and operate the highway system, perform special work, purchase equipment and tools, and pay the administrative and engineering costs of the Department. This would leave $36,000,000 available per year to do a $100,000,000 job. By reason of good management, at the end of 1943 there was a cash balance in the motor fund of approximately $35,000,000 which will be available for the post-war construction program.

To summarize the five-year requirements, there is estimated to be available $180,000,000 from current receipts, plus the $35,000,000 cash balance on December 31, 1943, or $215,000,000 of state funds to perform a $500,000,000 job. To start the first post-war-year program there would be available $71,000,000 towards a $100,000,000 job.

Present Engineer Shortage

There is much discussion on the subject of preparing detailed plans and specifications by the states and local communities, so that they may be available for starting work immediately after the close of hostilities. Excessive emphasis is being placed by some upon the Federal government's making funds available to state highway departments for such activities. Money is not the prime requisite. Sufficient state funds are available in Pennsylvania for all preliminary work, including surveys, plans, designs and purchase of right-of-way.

It has not been lack of funds which has delayed the preparation of detailed surveys, plans and designs for post-war construction, but rather lack of trained personnel which is at present in the armed forces or in war industries. Congress could aid this situation to a much greater degree by requesting the Army and Navy to release engineering personnel well in advance of actual demobilization of combat and similar units than by appropriating funds which cannot be utilized due to the lack of such personnel.

To complete the necessary field and office details for such a large program in Pennsylvania would be a big assignment under normal conditions. Under the present shortage of man-power it is a most difficult task, but it can and must be accomplished. To aid in this problem, we are engaging private engineer firms to prepare surveys and plans on large specific projects.

Here is the status on engineering and construction personnel in the Pennsylvania Department of Highways. On August 1, 1941, there were 367 men in the engineering corps, 441 draftsmen and 920 inspectors, or a total of 1,728 employees engaged in engineering and construction. On March 1, 1944, the records show 61 men in the engineering corps, 220 draftsmen and 261 inspectors, or a total of 542 men engaged in engineering and construction. Therefore, this year Pennsylvania has 31 per cent as large an engineering and construction organization as it had on August 1, 1941.

The progress of contract plans to date includes 224 miles of new highway at an estimated cost of $31,000,000, available for letting immediately. Present plans under consideration will increase that mileage and volume to approximately 500 miles at an estimated cost of $70,000,000 by the end of 1944. There will be a sharp increase in plan production when more engineers and draftsmen can be employed directly after the war.

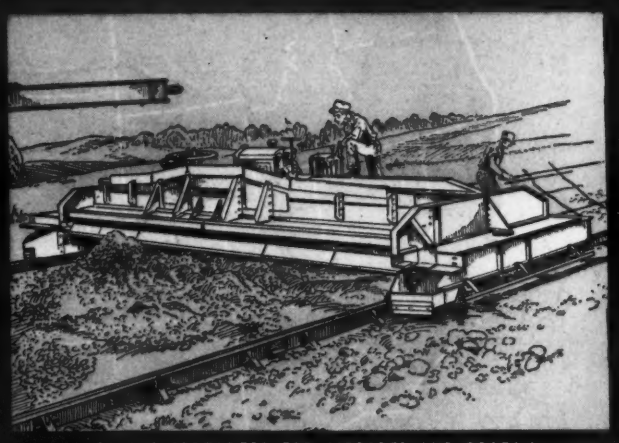
Future Highway Development

Pennsylvania recognizes the importance of the Interregional Highway System. The 1,200 miles allotted to Pennsylvania represents 3 per cent of our total state highway system, and Pennsylvania has no objection to incorporating this mileage into the existing Federal-Aid system, but does object strenuously to appropriating or allocating any funds specifically for construction on this system at the present time.

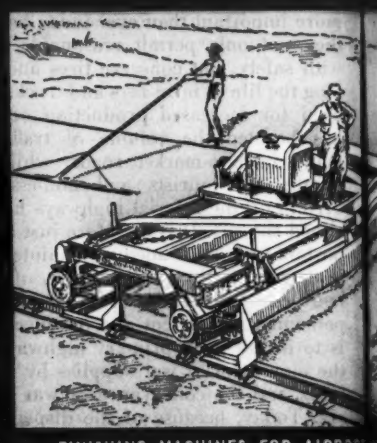
Each state knows better what is required within its borders than any blanket report can possibly designate. It is the thought of our best engineering and administrative minds that the construction of an Interregional Highway System can best be undertaken after a thorough and detailed study of present and ultimate costs of improvement has been completed. Commitments should not be made at this time which might prejudice the total balanced construction program of the various states.

Our comprehensive program of highway development includes projects in every section and in every county of Pennsylvania. The Lincoln, William Penn, Benjamin Franklin, National Pike, Lakes-to-Sea, Perry, Roosevelt, Buffalo-Pittsburgh, Susquehanna Trail, Lackawanna Trail, and all other important interstate and intrastate highways have been carrying an ever-increasing volume and weight of commercial traffic, which has been still more intensified during the war emergency. Extensive improvements are contemplated on all of these and similarly important roads. Special attention is being given to the elimination of bottlenecks in and adjacent to our larger centers of population.

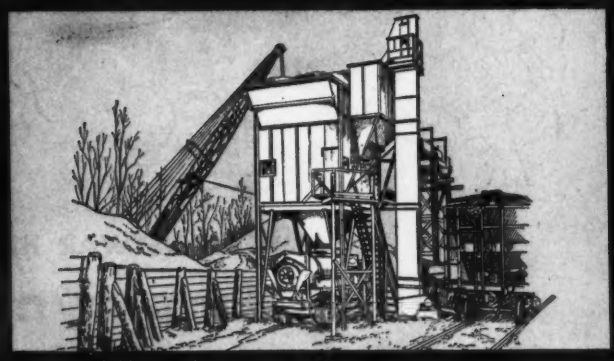
BLAW-KNOX *has the answer*



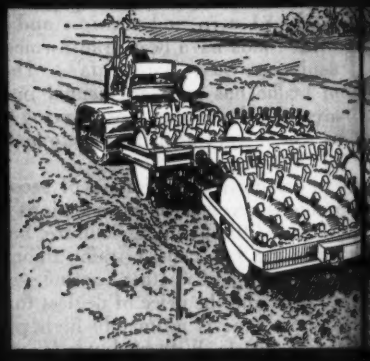
PAVING SPREADERS FOR AIRPORTS AND ROADS



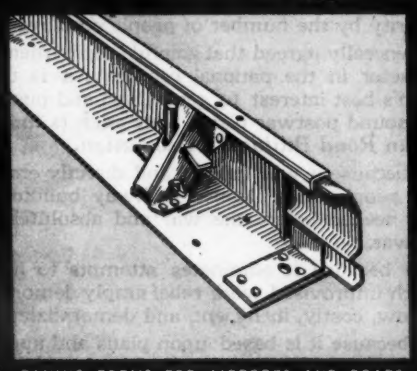
FINISHING MACHINES FOR AIRPORTS AND ROADS



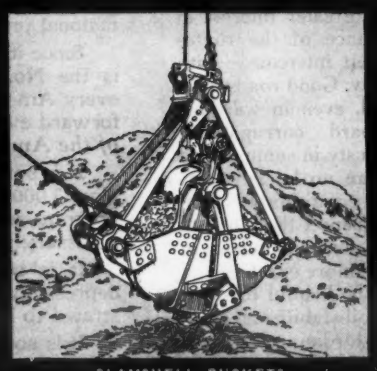
TRUCK MIXER LOADING PLANTS



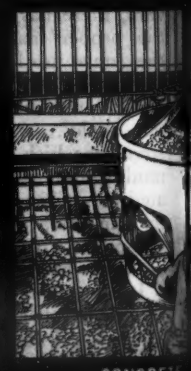
SHEEPSFOOT TAMPING ROLLERS



PAVING FORMS FOR AIRPORTS AND ROADS



CLAMSHELL BUCKETS



CONCRETE BUCKETS

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R. M. Orsatti
San Francisco — C. H. Grant Company
COLORADO
Denver — Ray Corson Machinery Co.
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New Haven — W. I. Clark Co.
DELAWARE
Philadelphia, Pa. — Giles & Ransome
DISTRICT OF COLUMBIA
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FLORIDA
Jacksonville — Florida Equipment Co.
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Louisville — Brandeis Mach. & Supply Co.
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New Orleans — Southern States Equip. Co.
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Billings —
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Omaha —
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Las Angeles —
San Francisco —

Right-of-way legislation in Pennsylvania permits property to be secured by agreement or condemnation, and there should be no delay in securing the necessary land acquisition in a very short time.

Future Federal Aid

A bill has been approved by the House Roads Committee to appropriate $500,000,000 a year for a three-year period to provide funds for state highway post-war construction. Under the proposed formula of allocating this sum, Pennsylvania would receive slightly less than $25,000,000 a year. For years, Pennsylvania and other important industrial states have not been securing their share of Federal appropriations. We are not seeking a Federal subsidy, as the sums requested are considerably less than the amount paid by Pennsylvania motorists and other taxpayers into the Federal treasury.

We believe that Congress should not attempt to appropriate funds to any specific class of highways, as such division should be left entirely to the judgment of the individual states. The money can then be expended on those highways where the need is greatest and most urgent.

Should Federal funds not be available, and this is a possibility which cannot be discarded lightly on account of the enormous obligations the Federal treasury will have to meet after the war, the program outlined in this article would have to be curtailed and modified or additional funds provided by the state.

However, the administration of Governor Martin believes implicitly and practices faithfully the doctrine of living within the available income, and that policy will be followed in Pennsylvania's highway program.

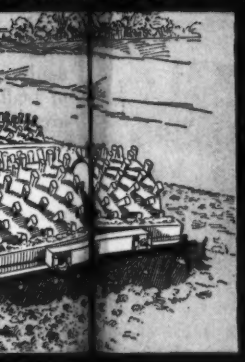
Proper inspection and maintenance of equipment and regular lubrication with wisely chosen lubricants will keep your machines on the job.

C. P. Croco Heads New Westinghouse Department

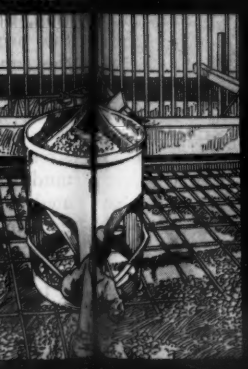
The appointment of C. P. Croco as Manager of the newly formed Welding Department of the Motor Division at the Trafford, Pa., Works of Westinghouse Electric & Mfg. Co., has just been announced. After eighteen years with the Westinghouse organization, Mr. Croco became Director of Engineering of the Federal Machine & Welder Co., Warren, Ohio, in 1943, and now returns to assume responsibility for engineering, manufacture and sales of all arc welding equipment and electrodes made at Trafford.

FASTER CONSTRUCTION

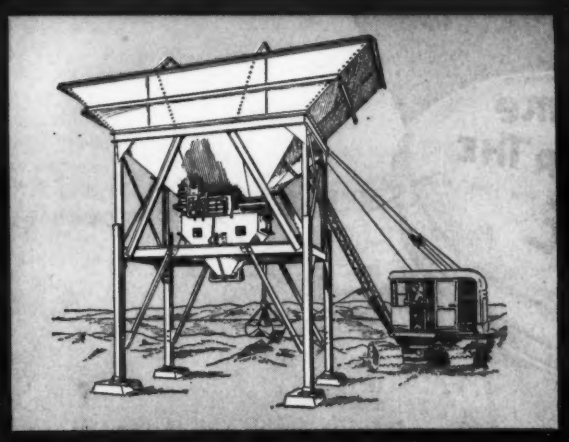
R AIRPORTS AND ROADS



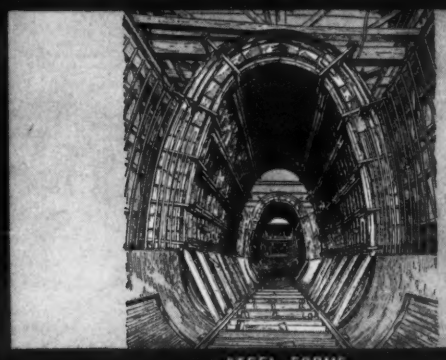
MPING RO



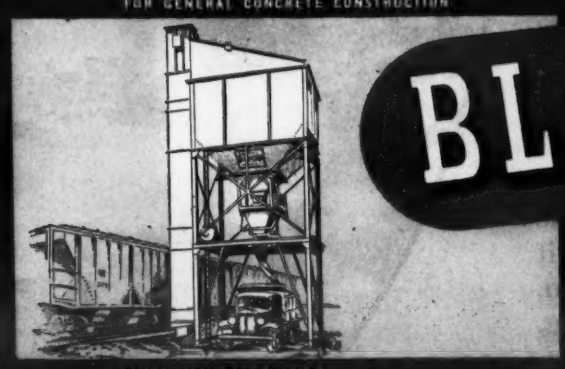
CONCRETE BUCKETS



AGGREGATE BATCHING PLANTS



STEEL FORMS
FOR GENERAL CONCRETE CONSTRUCTION



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That unbeatable combination of *correct design, rugged construction* and *assured performance* has made Blaw-Knox equipment first choice of construction men who have a reputation for getting things done in a hurry...You'll find this trouble-free equipment hard at work building roads, airports and general concrete construction all over the world.

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MISSISSIPPI
Amory — [illegible] Equip. Co.
New Orleans — Southern States Equipment Co.
MISSOURI
Kansas City — [illegible] W. Van Keppel Co.
St. Louis — [illegible] Howey Company
MONTANA
Billings — [illegible] Coast Equip Co.
NEBRASKA
Omaha — [illegible] Equipment Co.
NEVADA
Las Angeles — [illegible] E. M. Oviatt
San Francisco — [illegible] C. H. Grant Co.

NEW HAMPSHIRE
Barre, Vt. — Cassellini-Venable Corp.
Boston, Mass. — The Equipment Co.
Portland, Me. — Stanley-Cadigan Co.
NEW JERSEY
New York, N. Y. — R. E. Brooks Company
Philadelphia, Pa. — Giles & Ransome
NEW MEXICO
Albuquerque — Hardin & Coggins
NEW YORK
Albany — Larkin Equipment Co.
Buffalo — Tyrrow Corporation
Elmira — LeValley, McLeod & Kinkaid
Endicott — Newing Motors Co., Inc.
New York — R. E. Brooks Company
Rochester — Keystone Builders Supply
Syracuse — Syracuse Lumber Co.
Utica — McQuade & Sampson, Inc.

NORTH CAROLINA
Raleigh — Carolina Tractor & Equip Co.
Salisbury — Carolina Tractor & Equip Co.
NORTH DAKOTA
Fargo — Dakota Tractor & Equipment Co.
OHIO
Cleveland — H. B. Fuller Equipment Co.
Columbus — W. W. Williams Co.
OKLAHOMA
Oklahoma City — Leland Equipment Co.
OREGON
Portland — Contractors Equipment Corp.
PENNSYLVANIA
Philadelphia — Giles & Ransome
Pittsburgh — Drave-Doyle Company
RHODE ISLAND
Boston, Mass. — The Equipment Co.
SOUTH CAROLINA
Columbia — Self Hunt Road Machinery Co.

SOUTH DAKOTA
Rapid City — I. D. Evans Equip. Co.
TENNESSEE
Chattanooga — Hixon-Hasselle Co.
Knoxville — Wilson-Weesner-Whitaker
Nashville — Wilson-Weesner-Whitaker Co.
TEXAS
Dallas — Conley-Lott-Nichols Mach. Co.
Houston — R. E. Prescott & Co.
UTAH
Salt Lake City — Lund Machinery Co.
VERMONT
Barre — Cassellini-Venable Corp.
VIRGINIA
Roanoke — Roanoke Tractor & Equip. Co.
WASHINGTON
Seattle — Star Machinery Co.
Spokane — Empire Equipment Company

WEST VIRGINIA
Charleston — Charleston Tractor & Equip. Corp.
WISCONSIN
Milwaukee — Hunter Tractor & Mach. Co.
WYOMING
Billings, Mont. — Western Construction Equipment Co.
Denver, Colo. — Ray Corson Mach. Co.
ALASKA
Seattle, Wash. — Northern Commercial Co.
CANADA
Halifax, N. S. — Coleman Mach. Co., Ltd.
Montreal — Watson Jack & Co., Ltd.
Toronto — W. L. Ballentine Co.
Vancouver, B. C. — B. C. Equip. Co., Ltd.
Winnipeg — Kane Tractor & Equip. Co.
NEW FOUNDLAND
St. Johns — Dominion Dist. Co.

Drainage Problems At Two Navy Airfields

(*Continued from page* 25)

"tailoring" the field. The initial development in the way of improvement was to create 150-foot shoulders along all the runways, with 0.75 per cent slopes away from the pavement. This stopped cross-runway drainage and made interceptor ditches necessary.

The next step in improving the drainage was laying an 18-inch plain-concrete pipe parallel to the east-west runway at the toe of the north shoulder and under the north-south runway. The shoulder was so dressed that a definite drainage ditch was created at the toe. The 18-inch pipe enabled run-off to be carried under the north-south runway. Another interceptor was cut westward to the original north-south ditch to handle the run-off.

Within the triangle created by the crossing of the three runways, the inside shoulders provided a sizable depression. A catch basin was built in this hollow and two 24-inch concrete pipes were run west across the north-south runway to another ditch at the west side that was cut to empty into the north-south system. The main north-south ditch was cut to the Intracoastal Waterway and entered at sea level. This by-passed the old highway culvert and provided a much greater fall to the drainage system, adding an additional drop of 8 feet.

Even with this improved drainage, the subgrade under the paving failed to dry out rapidly enough to afford a stable base in the time required. Accordingly, the base material was exposed by windrowing the asphalt covering. After the base material had dried out sufficiently by evaporation, the asphalt material was relaid, using double crown sections wherever possible so as to afford lateral rather than longitudinal drainage. The original paving of the runway was done by a pair of Wood traveling mixers using 5.4 gallons of RC-1 asphalt per square yard. In the re-working, the total amount of asphalt was increased to 6.35 gallons per square yard.

Bagdad Field

Another example of airfield construction in the Pensacola area in which mixed-in-place sand-bituminous paving was used to excellent advantage is Bagdad Field, located approximately 3 miles southwest of Milton, the county seat of Santa Rosa County. In western Florida the sandy soil is generally suitable for mixture with cut-back or emulsified asphalts in the construction of flexible-type pavements.

The site selected possessed the desirable qualities of nearly uniform terrain which would require a minimum of grading but with adequate natural drainage in an easterly direction. Borings and soil tests confirmed the anticipated suitability of the existing soil for use as aggregate in the paving mix and that the porosity of the soil, with no close-lying impervious stratum, would assist materially in drainage. A heavy growth of scrub oak and brush blanketed the area; a moderate number of trees required removal.

The landing-field layout is unique in providing a large runway pavement area within a relatively small compass. An eight-pointed star-shaped field, resulting from imposing a square of a 1,800-foot side upon another similar square, the squares having a common center with the respective axes intersecting at a 45-degree angle, provides eight runways paired in four directions. This permits doubling the number of planes that may be accommodated since the parallel runways are separated by the width of the field. Also, landings and take-offs may be effected always within 22½ degrees of the direction of prevailing wind. The runways are comparatively short, 1,800 feet in length and 200 feet in width, but sufficiently long for the type of training plane using the field. The design lends itself to the possible future extension of three runways.

The field lies at an elevation approximately 160 feet above Mean Sea Level. The uniformly nearly level ground permitted the establishment of finished grades which are identical for corresponding points on the pavement and shoulders. Thus, the elevation of pavement on the inside perimeter, octagon-shaped, was set at 158.5 and the pavement sloped to the outside at right angles to the sides of the octagon at a uniform grade of minus 0.5 per cent. The shoulders, 100 feet wide, are sloped at minus 1.0 per cent from the high point of the pavement and at a 15:1 ratio from the low side. At the toe of the shoulder on the low side, shallow ditches parallel the pavement contours and discharge into outfall ditches leading to natural

(*Concluded on next page*)

Plan Tomorrow's Highway Today and include in your Specifications— TUTHILL HIGHWAY GUARD RAILS

TODAY leading Highway Engineers are drawing plans for Tomorrow's Highway and are including in their specifications TUTHILL HIGHWAY GUARD RAILS. Why? Because TUTHILL meets the exacting standards . . . of Safety . . . of Strength . . . of Low Installation and Maintenance Costs.

Why are TUTHILL Guard Rails safe, strong, easy to install and maintain? The *design* is the answer—concave surface, deflective action, and unusual visibility. (*Available now for maintenance and repairs.*)

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Los Angeles, Calif.

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Are you giving any thought to the cranes, shovels and draglines you will be needing for the big jobs being planned for the future.

It is none too soon to start taking stock of your excavator and material handling requirements. Only those with modern and efficient equipment can compete for the tremendous amount of work that must be done after Victory.

There is a LIMA designed and built for the job to be done, whether it be highway construction, metal and coal mining, sand, gravel and quarry work, levee work or any other kind of material handling projects.

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LIMA

SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

Speedy Construction Of Training Airfields

(*Continued from preceding page*)

water courses. It was determined that drainage structures could be limited to a single 600-foot length of 18-inch concrete pipe under the pavement at the northeast corner and two concrete check-spillways. The shoulders were blanketed with selected topsoil compacted to a depth of 3 inches and sprigged. The entire field area is enclosed by a hog-wire and barbed-wire fence supported on creosoted posts. The pavement design called for a single course of sand-bituminous mix of 5-inch compacted thickness on a prepared compacted sub-base which was plowed, harrowed and grubbed to a minimum depth of 12 inches below finished grade.

An existing county road bordering the west side of the field provided ready access to the site. Field surveying work by the contractor commenced August 3, 1943, followed two days later by a force engaged in removing the brush, timber and roots. Grading operations commenced August 18. The surface was first stripped to remove all deleterious material that would otherwise be included within the pavement areas. Upon excavation to approximate grade, the area was cleared of any remaining roots, grass or other rubbish and then thoroughly compacted to grade by sheepsfoot and pneumatic rollers. All suitable excavated material was utilized in completing fill areas and deposited in 6-inch layers, each layer being compacted before applying succeeding layers of material. The cut and fill quantities struck an almost exact balance.

By August 30, grading had progressed sufficiently to permit the application of asphalt, after which time both grading and mixing operations were conducted simultaneously at the site. Traveling mixers were used to apply RC-1 asphalt at the rate of 4 gallons per square yard. Immediately following the introduction of the asphalt into the soil, further procedures were effected to obtain a homogeneous mixture as well as to permit volatilization of light oils. Multiple-blade mixing machines and both tooth and disk harrows were run through the mix until it was considered to be in a satisfactory condition for spreading.

During this stage of processing, care was taken to prevent inclusion of water. Only small areas were opened at any time so that they could be quickly bladed to provide an effective seal against rain. When the paving mixture had been worked to the proper stage, usually requiring ten days, those areas were laid down, compacted by sheepsfoot and pneumatic rollers and finally bladed to grade. Further rolling by pneumatic rollers followed by steel rollers produced a finished pavement surface with any irregularities well within the tolerance of ¼ inch in 10 feet. Asphalt mixing was completed on October 19 and pavement-finishing operations were concluded October 31. Asphalt application for all paving averaged 4.006 gallons per square yard.

Other phases of construction such as drainage, fencing and grassing presented no problems and were prosecuted in an orderly schedule so that all activities were brought to conclusion at approximately the time the paving had been completed and the Field was ready for flight training.

Personnel

Canal Field was turned over to aviation training on August 25, 1943, and has operated with satisfactory results ever since. Bagdad Field was available for operations on October 31, 1943. The planning, design, and improvements at both Canal and Bagdad Fields were all done under the direction of the Public Works Officer of the Naval Air Training Center at Pensacola, Fla., by the Hardaway Contracting Co. of Columbus, Ga., and the Smith Engineering & Construction Co. of Pensacola, Fla. The experience gained in the improving of Canal Field was used most effectively in the design and construction of the large number of additional fields completed later in 1943.

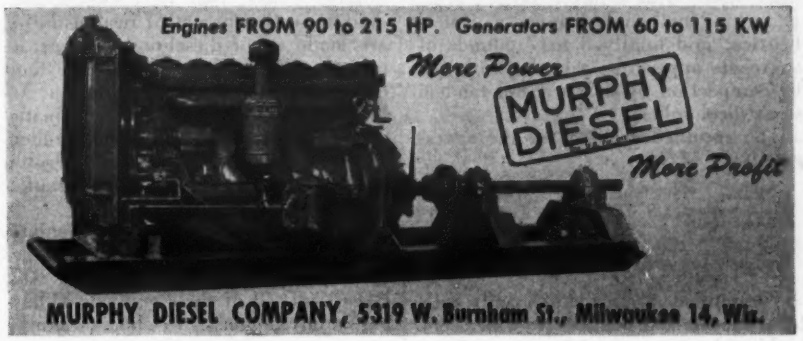
Westinghouse Names McKibbin to New Post

Announcement has been made of the appointment of John M. McKibbin as Assistant to the Vice President of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., with new duties including supervision of all product and industry advertising in addition to his present work as head of the Application Data & Training Department. McKibbin has been with Westinghouse since 1922, handling advertising and promotion activities.

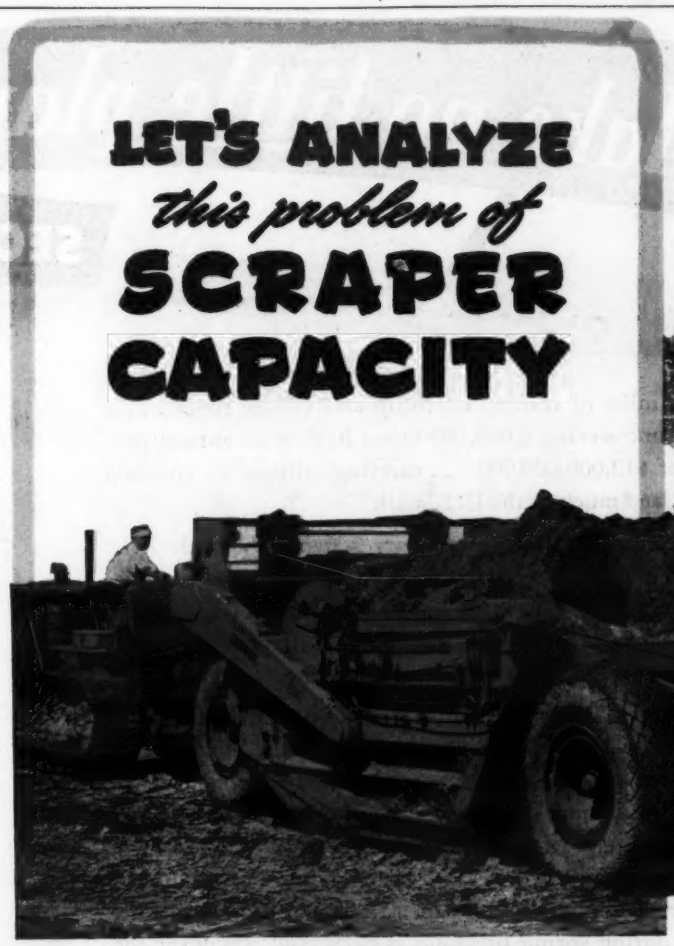
Yale & Towne Buys Kron Scale Business

The purchase of the scale business of the Kron Co. of Bridgeport, Conn., by the Yale & Towne Mfg. Co., Chrysler Bldg., New York City, maker of hoists, electric industrial and hand-lift trucks and similar equipment, has been announced. Facilities and personnel will be maintained in Bridgeport as heretofore and the present sales and service organization will be continued, but all will be under the general direction of the Philadelphia Division of Yale & Towne.

The Kron line of dial scales includes bench, platform, hopper and crane scales for batching concrete, asphalt and other materials, and for measuring the flow or consumption of fuel oil and other liquids. It is stated that no changes in the line are contemplated at present.

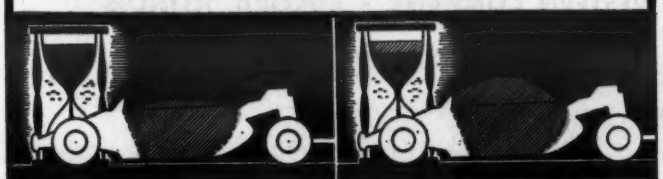

Engines FROM 90 to 215 HP. Generators FROM 60 to 115 KW
More Power
MURPHY DIESEL
More Profit
MURPHY DIESEL COMPANY, 5319 W. Burnham St., Milwaukee 14, Wis.

LET'S ANALYZE *this problem of* SCRAPER CAPACITY



TWO REASONS WHY "HEAPED" CAPACITY IS MISLEADING

First, it is important to remember that all materials tend to "swell" when loosened by excavation and loading. Moreover, each type of material has a different "percentage of swell", depending on the percentage of voids and moisture content. That's why "heaped" capacity can vary all over the lot . . . why a heaped load will seldom even equal the struck capacity of a scraper, in actual "pay dirt."



On short hauls and poor loading material, it usually doesn't pay to waste time getting a full "heaped" load because it may take you practically as long to load the last quarter as it did the first three-quarters—regardless of whose scraper you use. In other words, on short haul jobs, you'll be time and money ahead if you can avoid spending too much of your total time cycle in loading.

For years, it has been common practice among various scraper manufacturers to talk about "pay dirt" in the same breath with "*heaped*" capacity. Yet as every experienced dirt mover knows, figures on "heaped" capacity can be very misleading because *all classes of material tend to heap differently when loaded into a scraper.* Moreover, on many jobs, it doesn't pay to load "the last yard" because too much of the total time cycle may be consumed in loading—even with the help of a pusher.

Struck Capacity Safer!

For these reasons, LaPlant-Choate engineers have consistently maintained that the only logical way to estimate scraper yardage is on the basis of *struck* capacity—using the exact volume of the scraper bowl. Even then, the wise dirt mover usually deducts a certain percentage for "swell". However, by using *struck* capacity, you at least have a safer, more accurate figure to start with because "heaped" capacity is always an "unknown quantity." That's why it always pays to find out *which figure* a manufacturer is using, before accepting any claims regarding "yardage moved." For further information, see your LaPlant-Choate "Caterpillar" distributor, or write, LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

LAPLANT-CHOATE

Earthmoving and Land Clearing Equipment

Various Types of Equipment Used to Maintain N. C. Roads

(*Continued from page 29*)

material is usually as follows: 0.15 to 0.18 gallon of bituminous material; then 28 to 30 pounds of aggregate, smoothed by a light broom drag; next 0.20 to 0.25 gallon of bituminous material, dragged three times with a heavy broom drag, 12 feet in length and equipped with steel bristles; and finally 5 to 7 pounds of aggregate applied as a choke, followed by compaction by a 5 to 7-ton tandem steel-wheel roller.

The specified grading for the aggregate is:

Passing	Per Cent
½-inch square	100
⅜-inch square	85-100
No. 4 sieve	25-50
No. 16 sieve	0-4
No. 200 sieve	0-0.5

The retreads are made primarily with local sand mixed with 5½ to 6 per cent of bituminous material, and are either mixed on the road by blade graders or in a twin-shaft pugmill plant. The material is placed and shaped by blade graders and compacted by a pneumatic-tired roller and a 5 to 7-ton tandem steel-wheel roller.

Equipment

Prior to the war, North Carolina made sufficient replacements with modern units to keep its equipment up-to-date and in good condition. Several years before the war, a policy was established of specifying diesel power in all new motor graders and crawler tractors, and the Commission was rapidly putting its equipment on the following basis:

For maintaining untreated soil, gravel and stone roads in patrol sections of 80 to 100 miles, the equipment includes diesel-powered single-drive dual-wheel motor graders, weighing approximately 16,000 pounds; all-wheel-drive trucks, which for all practical purposes are a combination truck and wheel-type tractor, weighing approximately 7,000 pounds, net weight, and equipped with an 85-hp motor to develop 245 foot-pounds torque; pneumatic-tired pull-type 8-foot blade graders, weighing 4,700 pounds; road drags; and pneumatic-tired pull-type mowers with 6-foot cutter bars.

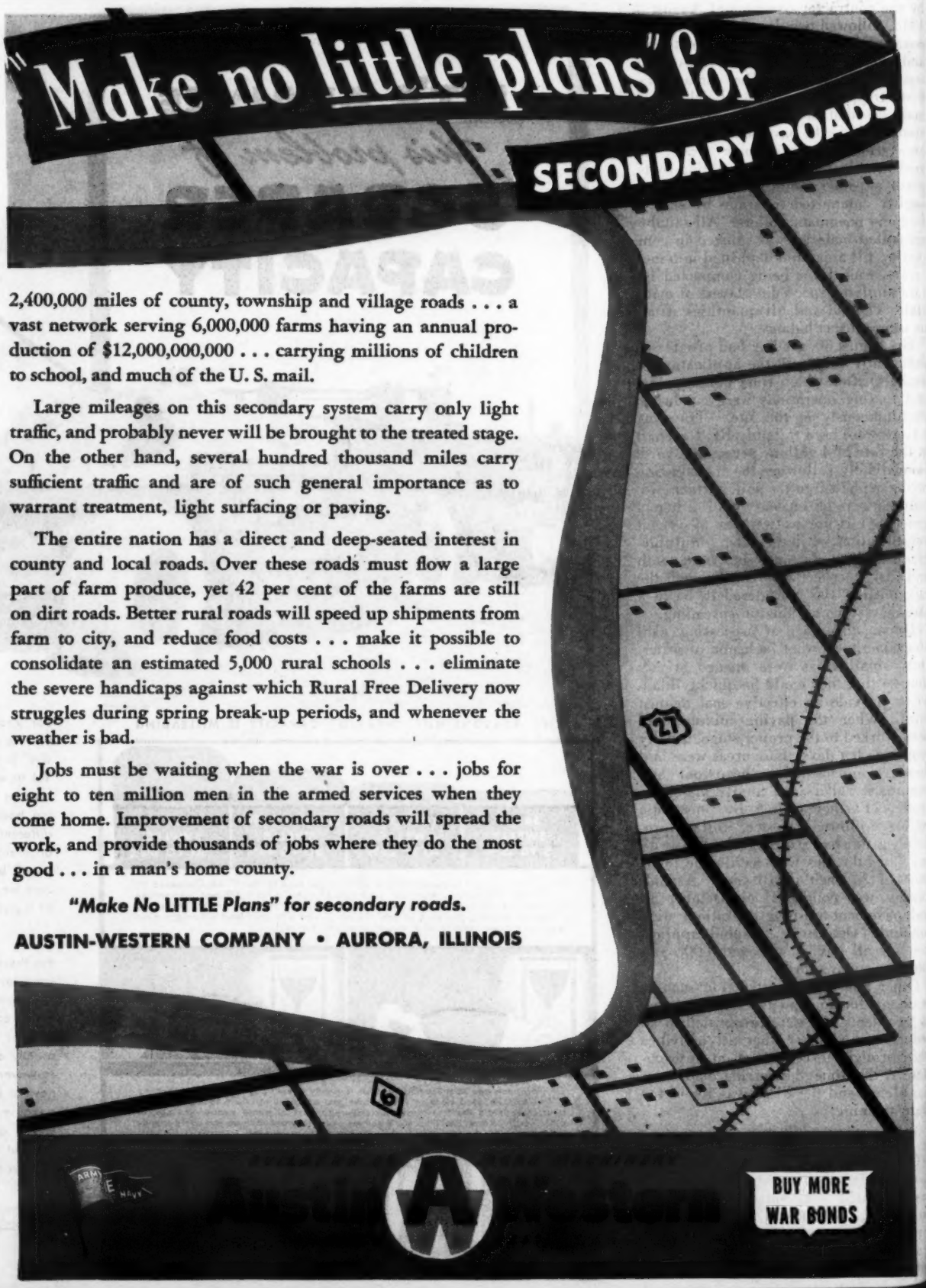
The equipment for maintaining paved sections, 50 to 90 miles in length, includes a 1½-ton truck with hydraulic-operated steel dump body; a 165-gallon tar kettle, mounted on two pneumatic-tired wheels; pneumatic-tired pull-type mowers with 6-foot cutter bars; and 3-ton portable patch rollers.

The auxiliary equipment and units for floating gangs, that is, crews without definite section or patrol responsibility, are made up of diesel-powered crawler tractors, D6, HD-7, TD-14 or their equivalent, of approximately 55 hp, Nebraska maximum drawbar; pneumatic-tired pull-type 8-foot blade graders weighing 5,800 pounds; and 1½-ton trucks with 1½-cubic-yard hydraulic-dump steel bodies.

On betterment and heavy maintenance, essential equipment includes diesel-powered crawler tractors, D7, HD-10, TD-18 or their equivalent, having approximately 75 hp, Nebraska maximum drawbar; pneumatic-tired pull-type 12-foot blade graders; diesel-powered tandem-drive motor graders weighing approximately 20,000 pounds; 300 to 500-gallon tar kettles with 10-foot spray bar; 9 x 16 portable jaw crushers; 10 x 30 and 15 x 24 semi-portable jaw crushers; 105, 210 and 315-cubic-inch air compressors; 24-inch cone and gyratory crushers; No. 7 and No. 10 concrete mixers; angledozers for 55-hp tractors; 4 to 5-cubic-yard pneumatic-tired scrapers for use with 55-hp tractors; an 8-cubic-yard pneumatic-tired scraper for a 75-hp tractor; ½ to ¾-cubic yard crawler-mounted excavators convertible to dragline, clam-

(*Concluded on next page*)

Left, mixing a sand retread on a state highway in North Carolina; right, one of the state's retread spreaders.



2,400,000 miles of county, township and village roads . . . a vast network serving 6,000,000 farms having an annual production of $12,000,000,000 . . . carrying millions of children to school, and much of the U. S. mail.

Large mileages on this secondary system carry only light traffic, and probably never will be brought to the treated stage. On the other hand, several hundred thousand miles carry sufficient traffic and are of such general importance as to warrant treatment, light surfacing or paving.

The entire nation has a direct and deep-seated interest in county and local roads. Over these roads must flow a large part of farm produce, yet 42 per cent of the farms are still on dirt roads. Better rural roads will speed up shipments from farm to city, and reduce food costs . . . make it possible to consolidate an estimated 5,000 rural schools . . . eliminate the severe handicaps against which Rural Free Delivery now struggles during spring break-up periods, and whenever the weather is bad.

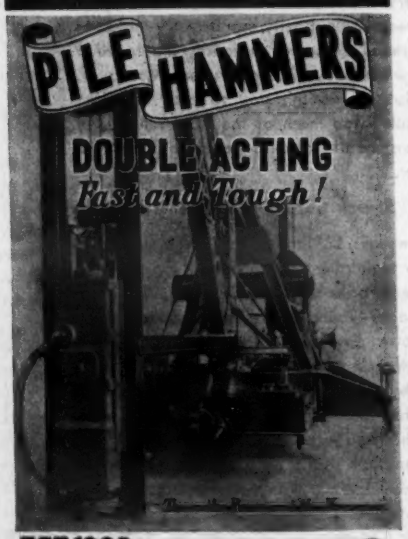
Jobs must be waiting when the war is over . . . jobs for eight to ten million men in the armed services when they come home. Improvement of secondary roads will spread the work, and provide thousands of jobs where they do the most good . . . in a man's home county.

"Make No LITTLE Plans" for secondary roads.

AUSTIN-WESTERN COMPANY • AURORA, ILLINOIS

BUY MORE WAR BONDS

UNION



EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey

Prison Labor Helps In Road Maintenance

(*Continued from preceding page*)

shell or shovel service; and 1½-ton dump trucks of the type previously specified.

For retreating surface-treated roads, the equipment required is 800 to 1,000-gallon semi-trailer-mounted bituminous distributors pulled by conventional 1½-ton truck-tractors with heavy-duty rear axle and heavy-duty power unit; 5 to 7-ton tandem rollers; a 3-ton portable patch roller; a 2-car tank-car heater with fuel-oil burners and mounted on four pneumatic-tired wheels; a 24-inch x 24-foot belt conveyor mounted on two pneumatic-tired wheels; a 1½-ton truck with 1½-cubic-yard hydraulic-dump steel body equipped with a segment-valve tailgate and stone spreader attachment with segment valve; a blower and broom with power-driven brush mounted on a four-wheel pneumatic-tired trailer; a broom with power-driven brush mounted on a four-wheel pneumatic-tired trailer; and broom drags.

In addition to the equipment listed in the preceding paragraph, the following is considered essential for retreading with 100 pounds or more of mixed-in-place sand or sand-and-coarse-aggregate mix: a diesel-powered tandem-drive motor grader weighing approximately 20,000 pounds; shop-built multiple-blade drag-type retread pavers; and a pneumatic-tired roller.

Prison Labor

A department of North Carolina's organization which, prior to the war, was not looked upon with much enthusiasm has become a source of man-power that has proved an asset in this period of labor and equipment shortage. I refer to the Prison Department. When the state assumed the responsibility for the county roads in North Carolina, the county prisoners were a part of the obligation. There are now a total of 6,130 prisoners, of which 4,202 work on the roads. However, even the prison population has fallen off in this time of man-power shortage, and now is 60 per cent of the 1940 maximum prison population of 10,200.

The prisoners who work on the roads are housed in seventy-nine prisons distributed over the state. Although called "camps", these prisons are modern brick structures. Most of the prisoners work under armed guards in squads of from seven to twelve men. It is customary to have one guard for each ten prisoners. These squads are used on quarry work, Mud-Jack operations, ditching, loading, clearing, right-of-way clean-up, manufacture of concrete pipe, pipe laying, patching pavements, sealing cracks in pavement slabs, and similar maintenance jobs where ten or more men can be used efficiently.

Some camps are made up of prisoners who have proved their trustworthiness and are classified as "honor grade". These men, who work without the armed guard, can be handled in smaller squads and hence can be used more efficiently. In spite of the man-power shortage, the North Carolina ruling which prohibits the use of prisoners for operating motor equipment has not been broken. The prisoners are used primarily as common labor but they do operate pneumatic drills and tampers, and occasionally are used on pull-type graders.

Prisoners work five and a half 10-hour days per week, portal to portal time, exclusive of the lunch hour, when weather and "sun time" permit. The North Carolina law requires that prisoners be in their camps between sunset and sunrise, which makes it impossible to work a full 10-hour day during the mid-winter months.

The Prison Department is set up as a separate division of the highway organization for administrative and accounting purposes. It does not have a budget allotment but receives its funds from the bookkeeping transaction by which the maintenance department is charged for the prisoners who are actually worked on the road. After allowances are made for half-day Saturdays, short winter days and bad weather, this charge amounts to approximately $1.75 a day per prisoner on the road. This charge for prison labor takes care of their maintenance, which includes housing, feeding, clothing, and guarding, and also furnishes medical care, and their spiritual, recreational and educational facilities.

A Mud-Jack crew working on a concrete pavement in North Carolina. The two white men on the left are employees of the State Highway and Public Works Commission. The others are honor-grade negro prisoners who, in North Carolina, handle common-labor jobs in maintaining the highways.

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LUBRICATING JOB

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THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
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Booklet of Blueprint And Drafting Equipment

A complete line of equipment for the drafting and blueprint room is described and illustrated in a booklet issued by the David White Co., 320 West Court St., Milwaukee 12, Wis. Among the items included are bow pencils, ruling and tracing pens, slide rules, triangles, tracing cloth, complete drawing kits, and a new type of adjustable lamp. Both enclosed and open arc carbons are listed, with a table of specifications from 5/16-inch to ⅝-inch diameter, for blueprinting and photo-engraving work.

Copies of the 15-page catalog, "Blue Print Room Requirements and Drafting Room Specialities", may be secured upon request to the manufacturer. Just mention this item.

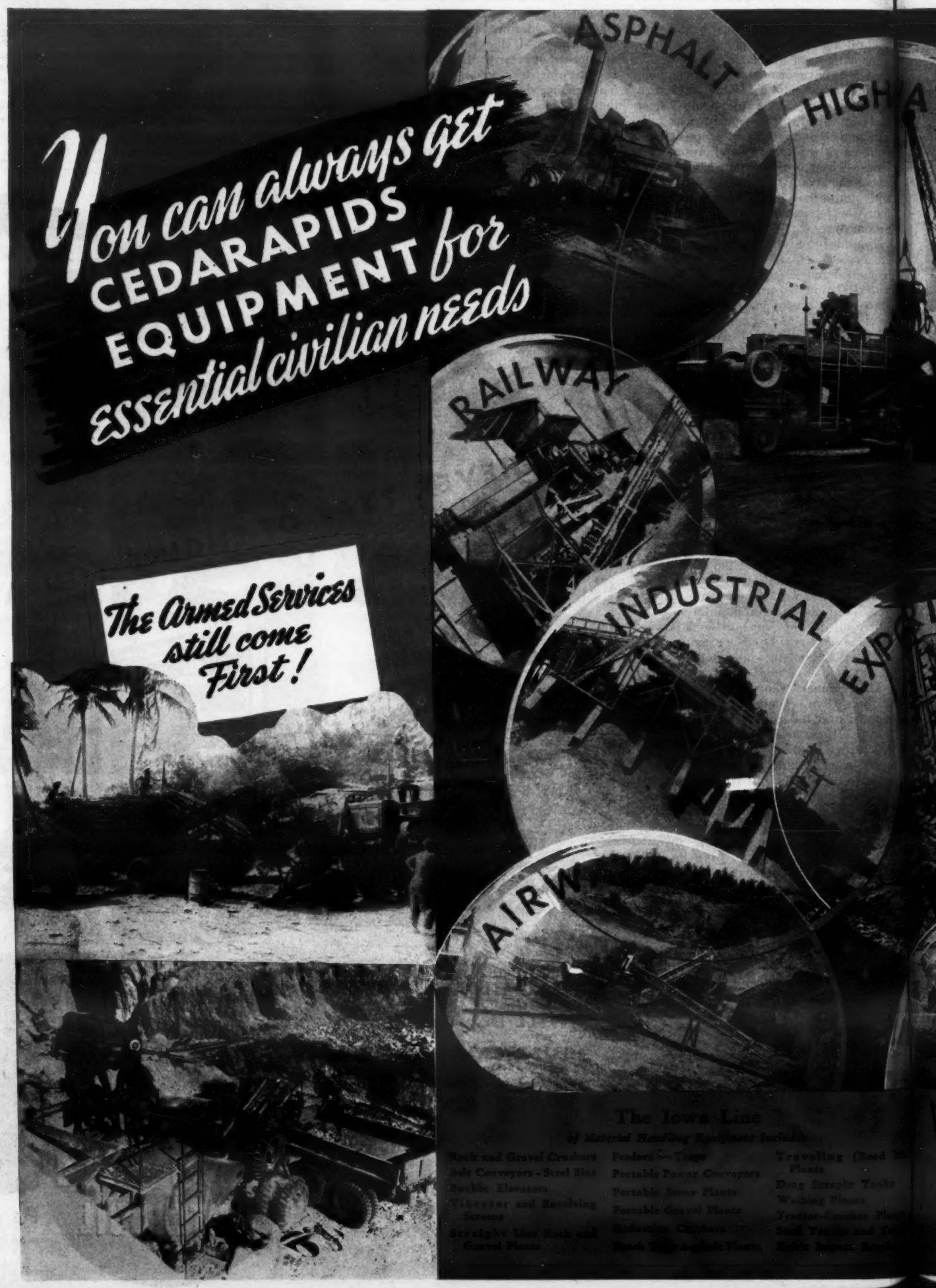
Post-War Park Projects Planned in New Jersey

Plans for the post-war development of existing parks and forests, calling for nineteen projects and an expenditure of $10,313,000, have been submitted to the State Planning Board by the New Jersey Department of Conservation and Development. Besides the improvement of state-owned land, part of this expenditure will go toward the acquisition of 4,414 acres to supplement present holdings. The project calls for the erection of bathhouses, boat landings, cabins, the development of foot-trails and bridle trails and numerous other facilities, to provide for an anticipated 3,000,000 visitors annually.

The Cheesequake State Park in the Raritan Bay section of Middlesex County, and the old iron-works village of Allaire, formerly the property of the late Arthur Brisbane, are among the places due for improvement under this program. Work is expected to start as soon as a post-war program for handling public works projects begins to function.

New Public Relations Director at E. I. du Pont

The appointment of Harold Brayman as Director of the Public Relations Department, succeeding the late Theodore G. Joslin, has been announced by E. I. du Pont de Nemours & Co., Wilmington, Del. Prior to joining the du Pont organization as Assistant Director of Public Relations in 1942, Mr. Brayman served as correspondent for a number of newspapers.



Departmental News From B. F. Goodrich

A new Rubber Suspension Sales Department, to be in charge of John D. Beebe, has been announced by The B. F. Goodrich Co., Akron, Ohio. The new department will handle sales of Torsilastic rubber springs, Vibro-Insulators, which are made of rubber and metal and designed primarily for the elimination of vibration, and devices for sound dampening. In addition to Mr. Beebe, who has been with the Goodrich organization for over twenty years, George Wertz and Don Schlemmer have been assigned to the new department.

After several months on special war assignments as a civilian specialist on rubber problems in North Africa, China, India, Australia and other locations in the Pacific war zone, Charles W. Staacke has returned to his position as Belting Sales Engineer at Goodrich.

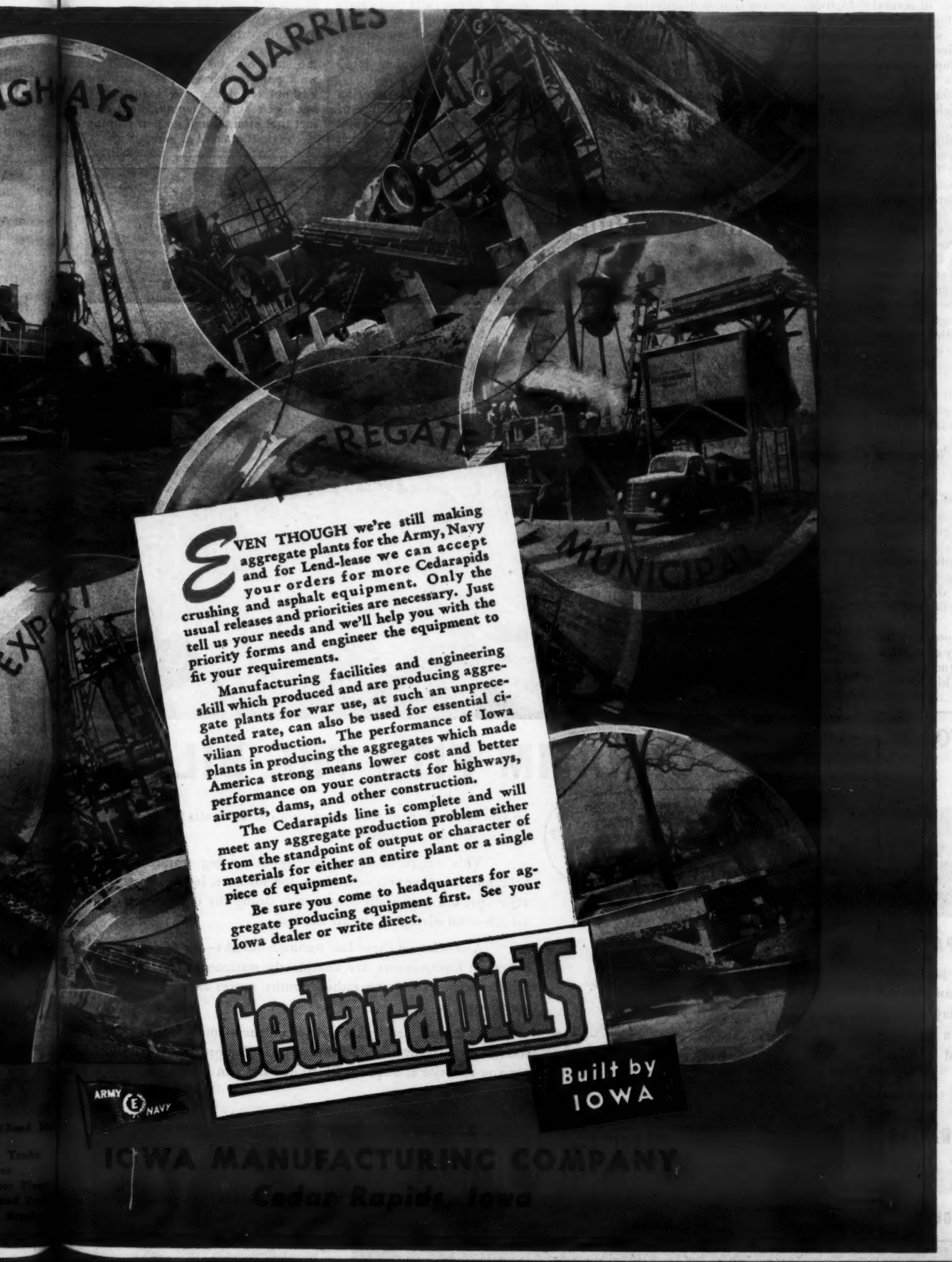
Wire-Rope Electric Hoists

Yale Cable King wire-rope electric hoists for a variety of lifting and hoisting jobs in contractors' and state and county highway department shops and garages are described and illustrated in a new bulletin recently issued by the Yale & Towne Mfg. Co., Philadelphia Division, 4531 Tacony St., Philadelphia, Pa. The various standard models of the Cable King are depicted, and their features, including simplicity of design, operation and maintenance, standardized interchangeability of parts, ruggedness and strength, are discussed. Practical provision for air cooling to eliminate brake heat is one of the exclusive features of these hoists.

Copies of this bulletin on Cable King electric hoists, which are made in capacities from ¼ to 10 tons, are now available.

Smith, Vice President Of Worthington Corp.

The Worthington Pump & Machinery Corp., Harrison, N. J., has announced the appointment of Walter D. Smith of Tulsa, Okla., as Commercial Vice President. Mr. Smith has been connected with the Worthington organization since 1923, except for a period of three years, and for the past four years has been Manager of Worthington's Tulsa District Office, as well as Southwestern Manager of the Engine Sales Division. In his new capacity, Mr. Smith will supervise Worthington's business in the southwest.



EVEN THOUGH we're still making aggregate plants for the Army, Navy and for Lend-lease we can accept your orders for more Cedarapids crushing and asphalt equipment. Only the usual releases and priorities are necessary. Just tell us your needs and we'll help you with the priority forms and engineer the equipment to fit your requirements.

Manufacturing facilities and engineering skill which produced and are producing aggregate plants for war use, at such an unprecedented rate, can also be used for essential civilian production. The performance of Iowa plants in producing the aggregates which made America strong means lower cost and better performance on your contracts for highways, airports, dams, and other construction.

The Cedarapids line is complete and will meet any aggregate production problem either from the standpoint of output or character of materials for either an entire plant or a single piece of equipment.

Be sure you come to headquarters for aggregate producing equipment first. See your Iowa dealer or write direct.

Cedarapids

Built by IOWA

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa

Connecticut's Roads For After the War

Pre-War Financing Must Be Increased to Care for the Vital Traffic Needs, Says Commissioner in Interview

✦ PLANS now in various stages of development in the Bureau of Engineering and Construction of the Connecticut State Highway Department are aimed at relieving traffic conditions in several areas of the state, according to Commissioner William J. Cox, when interviewed recently at his office in Hartford, Conn. Two major improvements in east and west facilities along the coast are under consideration. On the first of these, an express highway alternate for U. S. 1 across Fairfield County, surveys are in the preliminary stage. The second, a section between Guilford and the Connecticut River, is substantially further along. Some smaller projects east of the Connecticut River are also in prospect.

The route between Hartford and the New York State line via New Britain, Waterbury and Danbury is the subject of plans that have reached a stage where they are ready for discussion with the authorities of the localities to be served. Further legislation will be required for this route to cover the question of non-access, a matter of utmost importance where the highway is to traverse heavily settled areas.

The major difficulty with these and other large projects is that an adequate program of needed construction cannot be financed with the same volume of funds that was available in pre-war years, without bond issues.

Method of Financing

The general policy of financing highway construction and maintenance in Connecticut has been "pay-as-you-go" with a 3-cent gas tax. The other sources of revenue for state highway operations are car registration fees, drivers' licenses, and tolls on the Merritt and Wilbur Cross Parkways.

The State Legislature apportions the total state highway budget by categories, such as maintenance, construction, etc., within the highway fund. This fund receives its major sums from the receipts of the Motor Vehicle Department after the expenses of the latter department have been deducted. In addition, a part of the cost of the State Police Department is paid from the highway fund and the balance from the general fund of the state.

Commissioner Cox points out that the total money available for state highway construction and operation in Connecticut has been around $8,000,000 annually for a number of years. However, about one-quarter of this has been secured through bond issues for specific parkway and bridge construction, the interest and amortization of which have been taken care of by 10-cent tolls. This cannot go on in the future if Connecticut is to have an adequate and well-maintained highway system and retain her place among the North Atlantic states.

Man-Power Situation

In considering state highway activities during the war, and particularly in planning for construction after the war, that is, the preparation of contract plans to put on the shelf ready for lettings as soon as the war is over, the manpower situation has a serious effect. In February, 1944, there were a total of 1,200 established positions for salaried employees in the State Highway Department of Connecticut. Of these, 635 were vacant because of enlistment and draft in the armed forces, and employees leaving the service of the state for war jobs. As of the same month, there were 1,900 established hourly paid positions, chiefly maintenance, of which 1,143 were occupied.

In the entire Bureau of Engineering and Construction, which has charge of surveys and construction, there were 562 established salaried positions, of which only 211 were filled. In six of the engineering field offices in March, there were 377 established positions, of which only 6 were clerical, and there were only 109 persons employed in these positions.

In the Division of Location and Design in Hartford, there are 79 established positions, of which only 29 are filled, while in the Division of Bridge Design there are 32 established positions of which only 19 are filled at present. The Bureau of Highway Boundaries and Right-of-Way, which has the responsibility of acquiring right-of-way for future construction projects, has a total of 109 established positions of which at present only 44 are filled.

The Department has made no effort to employ women to fill the positions of engineers who have left the employ of the state but has just carried on with what personnel has not been drafted or has not left for a war industry. This has been further complicated by the fact that even though no new employees

(*Continued on page* 80)

THE "FEATHER TOUCH" CONTROL

The BURCH TRUK-PATROL

will do more different jobs and will do them better because it is easier controlled than any other. The Burch is not merely a scraper, it will cut and plane and is ideal for shoulder work.

Manufactured by

The BURCH CORPORATION

Crestline, Ohio

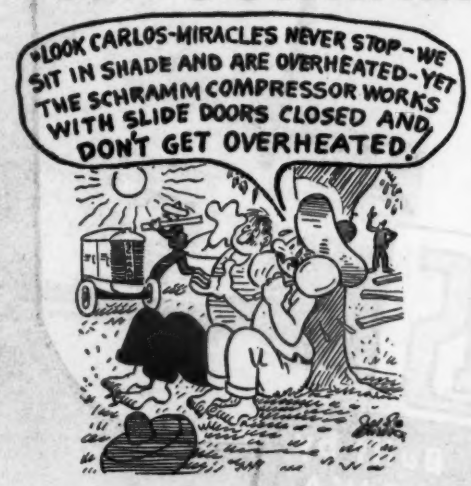
Equipment Since 1875

Don't Forget, BUY BONDS

When your construction job calls for . . .

A TOUGH AIR COMPRESSOR

. . . SCHRAMM FITS THE BILL!


"LOOK CARLOS-MIRACLES NEVER STOP-WE SIT IN SHADE AND ARE OVERHEATED-YET THE SCHRAMM COMPRESSOR WORKS WITH SLIDE DOORS CLOSED AND DON'T GET OVERHEATED!

So you've another tough construction job that calls for an air compressor *able to stand anything?*

This ruggedness you specify—it's a big feature in Schramm Air Compressors. Note, for instance, in the above action picture how easily Schramm is doing the compressed air job—and giving all the air needed.

And—during these hot summer months—the fact that Schramm Compressors are completely watercooled to give service equal to winter weather months, means an advantage worth noting.

Schramms are lightweight—compact—sturdy units. If you are not already using a Schramm Air Compressor, it will pay you to write at once for illustrated Bulletin EC-44.

War Department Photo

A Caterpillar diesel tractor with a LeTourneau crane handling an LCP (Landing Craft for Personnel) boat after a successful landing on an island in the South Pacific.

Industry Committee On Surplus Equipment

At a meeting of construction equipment manufacturers held in Washington, D. C., on May 10 (See C. & E. M., June, 1944, page 22), a committee was appointed to be known as the Construction Machinery Manufacturers War Surplus Committee and consisting of the following members: Chairman, E. R. Galvin, President, Tyson Roller Bearing Corp.; W. B. Greene, Vice President and Treasurer, Barber-Greene Co.; Howard Hall, President, Iowa Mfg. Co.; B. C. Heacock, Chairman of Executive Committee, Caterpillar Tractor Co.; Paul B. Cochran, General Manager, Buckeye Traction Ditcher Co.; T. M. Deal, President, Link-Belt Speeder Corp.; C. D. Macpherson, Sales Dept., Gar Wood Industries, Inc.; John L. McCaffrey, Second Vice President, International Harvester Co.; W. A. Roberts, Vice President, Allis-Chalmers Mfg. Co.; Chauncey B. Smythe, Vice President, Thew Shovel Co.; L. E. Dauer, Vice President, Trackson Co.; B. F. Devine, Manager, Construction Machinery Division, Chain Belt Co.; G. J. Dimond, Sales Manager, Koehring Co.; Robert T. Harris, Vice President, Blaw-Knox Division, Blaw-Knox Co.; Henry N. Schramm, President, Schramm, Inc.; R. K. Stiles, Vice President, Austin-Western Co.; D. D. Kennedy, President, Foote Co.; J. E. Gaylord, Jaeger Machine Co.; and W. McK. White, President, White Mfg. Co.

Charles M. Upham, Engineer-Director of the American Road Builders' Association, was appointed secretary of the Committee, and was authorized to confer with W. L. Clayton, Administrator, Surplus War Property Administration, and others concerned with the disposal of war surplus equipment and to keep the committee advised.

At a subsequent committee meeting, it was decided that the best interests of all could be served by dividing the construction machinery industry into groups and appointing a contact representative for each group, as follows:

Asphalt plants, Kenneth Lindsay, Iowa Mfg. Co.; bituminous distributors, tar kettles and maintenance equipment, L. W. Glaser, Littleford Bros. Co.; bituminous finishers, continuing loaders, and driers, W. B. Greene, Barber-Greene Co.; bucket loaders, W. H. Bosworth, Geo. Haiss Mfg. Co.; compressors, H. N. Schramm, Schramm, Inc.; cranes and shovels, C. B. Smythe, Thew Shovel Co.; crushers, Kenneth Lindsay, Iowa Mfg. Co.; ditchers, Paul B. Cochran, Buckeye Traction Ditcher Co.; finishing machines, forms, batchers, and buckets, R. T. Harris, Blaw-Knox Co.; motor graders and street sweepers, R. K. Stiles, Austin Western Co.; hoists, bodies and winches, C. D. Macpherson, Gar Wood Industries; construction mixers, G. J. Dimond, Koehring Co.; truck mixers, B. F. Devine, Chain Belt Co.; miscellaneous (small tools), W. McK. White, White Mfg. Co.; pavers, D. D. Kennedy, Foote Co.; pumps, J. E. Gaylord, Jaeger Machine Co.; rollers, J. L. Connors, Galion Iron Works & Mfg. Co.; scrapers, rooters and tampers, representative to be named later; and tractors and bulldozers, W. A. Roberts, Allis-Chambers Mfg. Co.

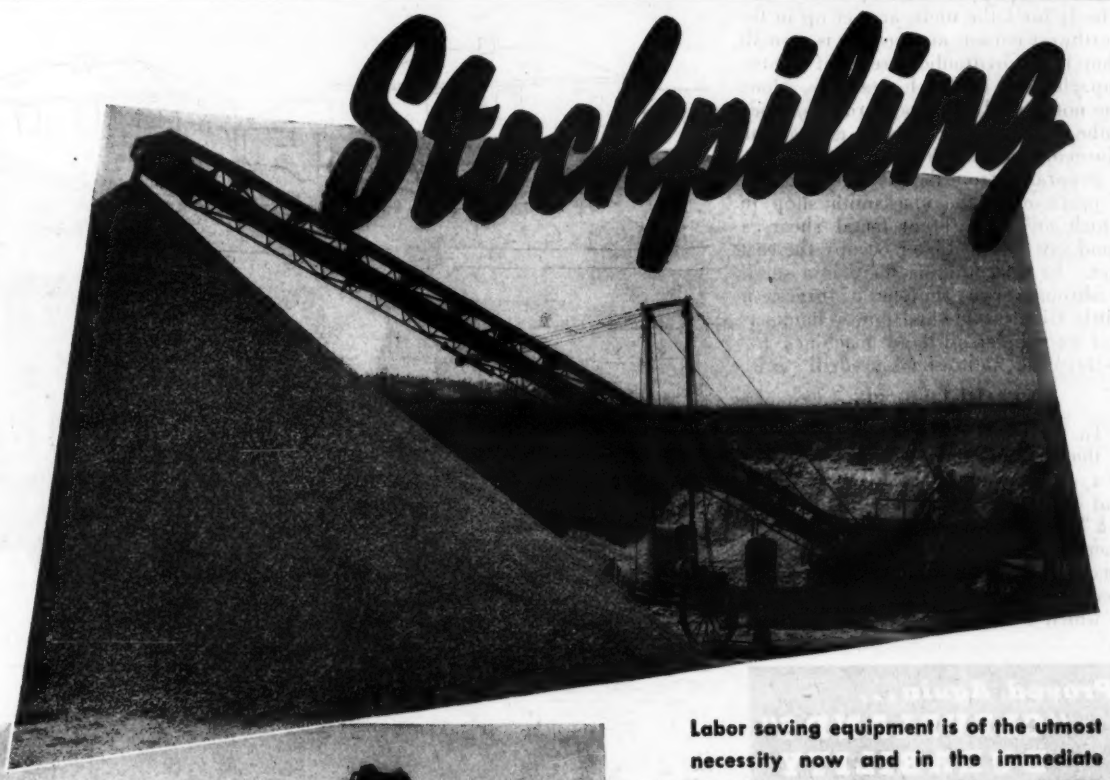
New War Public Works Projects Under FWA

Announcement has been made by the Federal Works Agency of the approval of 277 new war public works and services projects, for which the FWA has allotted approximately $16,000,000 of Lanham Act funds. These projects are spread over forty-two states, Alaska and Hawaii. Financing of this group of projects was made possible by a recent additional appropriation of $115,000,000 for FWA programs.

Of the 277 projects, 150 are in the war public works category, including water works, sewerage systems, hospitals, schools, recreation centers for service men, and similar projects, the total estimated cost for which is about $16,000,000. Of this, Federal funds represent about $12,500,000.

The remaining 127 projects are in the war public services category, and involve approximately $4,000,000 in Federal funds.

WELDS WELL DONE. Reason Enough—
for Simplified Arc Welding's rise in the Construction Field.
Contractors Were Skeptical Too!
Of course, everyone is when new methods are introduced for doing a better job with greater speed. Welds well done . . . like those obtained with Hobart "Simplified" Arc Welding... are reason enough for welding's acceptance and rise in the construction field. You too, can depend on Hobart's exclusive features to do a good job and to help you meet completion dates without penalty.
COMPARE the performance of the HOBART before you buy any arc welder.
PRIORITY Controls Allotments on Welders
Essential Status Qualifies You. Write Today!
HOBART BROS. CO., BOX CE-74, TROY, O.
HOBART "Simplified" ARC WELDERS
"One of the World's Largest Builders of Arc Welders."



Labor saving equipment is of the utmost necessity now and in the immediate months to come. To meet this need, WPB has released a limited schedule of Barber-Greene Model 82-A Bucket Loaders and Wheel Mounted and Permanent Belt Conveyors.

Preparation of aggregate and stock piling sized material is greatly facilitated with Barber-Greene Permanent and Portable Belt Conveyors. Reclaiming from stock piles is speeded up using the high capacity Model 82-A Bucket Loader, requiring less idle truck time. Often truck drivers easily fill in as loader operators loading their own trucks.

Barber-Greene engineers can assist you in utilizing your present equipment to its fullest advantage, as well as suggesting new equipment if it is necessary. Write to Sales Engineering Department, Barber-Greene Company, Aurora, Illinois, U.S.A.

44-24

BARBER-GREENE
AURORA, ILL.

Cleaning and Repair Of Forest Equipment

(*Continued from page* 12)

contains a Lodge & Shipley lathe with a 6-foot bed and 18-inch swing, flanked by a steel table carrying six reels of metal wire used with a Mogul Metallizer for rebuilding worn shafts. Next is a Canedy-Otto drill press, while a small South Bend bench lathe with a 3-foot bed and 8-inch swing is installed on the work bench under the south windows beside a small Delta drill press.

On the west side of the room stands a World War I Seneca Falls portable machine shop. This is a completely equipped lathe with 9-inch swing on a 5-foot bed. Next in line is a special shop-built machine for testing, under hot-water pressure, motor blocks and heads which have been repaired by the Kerkling cold weld method. A Van Dorn saw and a Black & Decker pedestal grinder, equipped with special 6-inch wheels for lathe tools, are set up in the northwest corner, and nearby is a small shop-built hydraulic press of 10-ton capacity with a 12-inch clearance. Along the north wall is a Rockford 8-foot-bed lathe with a 16-inch swing and a Van Norman brake-drum lathe.

Separated from the machine shop by a partition is the blacksmith shop in which an Ohl 10-foot metal shear, a band saw and a jointer occupy the east end. In this building there is a small washroom, two shop-built forges, a Little Giant 100-pound power hammer, and two Ingersoll-Rand machines for re-threading and reshanking drill steel.

The Welding Shop

To the west of the blacksmith shop is the welding shop, where the northeast corner is separated by fireproof and lightproof curtains behind which P & H Hansen and USL arc welders are operated. A special shop-built jig is used for building up track rollers. It consists of a metal drum to hold water in which a revolving shaft is so placed that the roller is under water except for the top 2 or 3 inches to which metal is being welded. The use of this device has eliminated earlier troubles experienced with separation of the steel roller from its cast hub during and after welding.

Bottled gas and four Smith and Victor welding and cutting torches are used in the oxy-acetylene operations conducted in the other portion of the building.

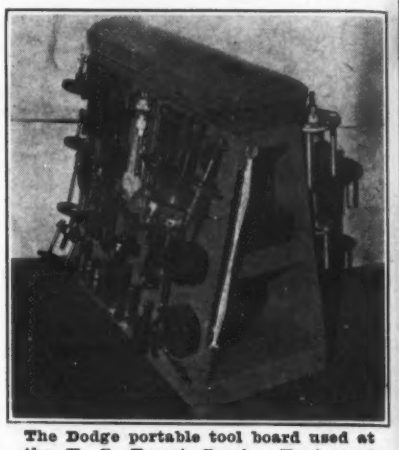
Cleaning and Painting

In the next building a Kerrick Kleaner and a Malsbary steam cleaner are used for all equipment, prior to shop work. A hydraulic hoist, remodeled from a filling-station lubrication rack, is used for raising the front ends of all units high enough to give the cleaning crew full access to the undersides. Air for these operations, as well as other uses at the depot, is furnished by a Rix compressor driven by a 20-hp Wagner electric motor. The compressor, as well as a metal receiver tank 3 feet in diameter and 10 feet high, is housed in a 10 x 10-foot building constructed west of the paint shop, from which lines convey the air under pressure to various points of use.

Next in line to the west is the paint shop which has two 10-foot overhead doors in the south side. Cabinets for paint storage line the east wall, in the south wall is an incoming air filter, while two 24-inch fans exhaust the air through outlets in the north wall. The shop is equipped with three DeVilbiss and one Binks paint guns and a Sioux sander.

The Body Shop

The west building in the row houses the body shop in which a body and fender mechanic utilizes a Blackhawk Porto-Power body building machine and a Chicago Pneumatic hammer for body and fender repairs. A Baldor bench grinder is on the north-wall work bench and portable tools include a Van Norman and a Black & Decker electric drill and two Van Norman sanders. A Victor welding torch used with Victor valves on gas cylinders completes the equipment in the body shop.

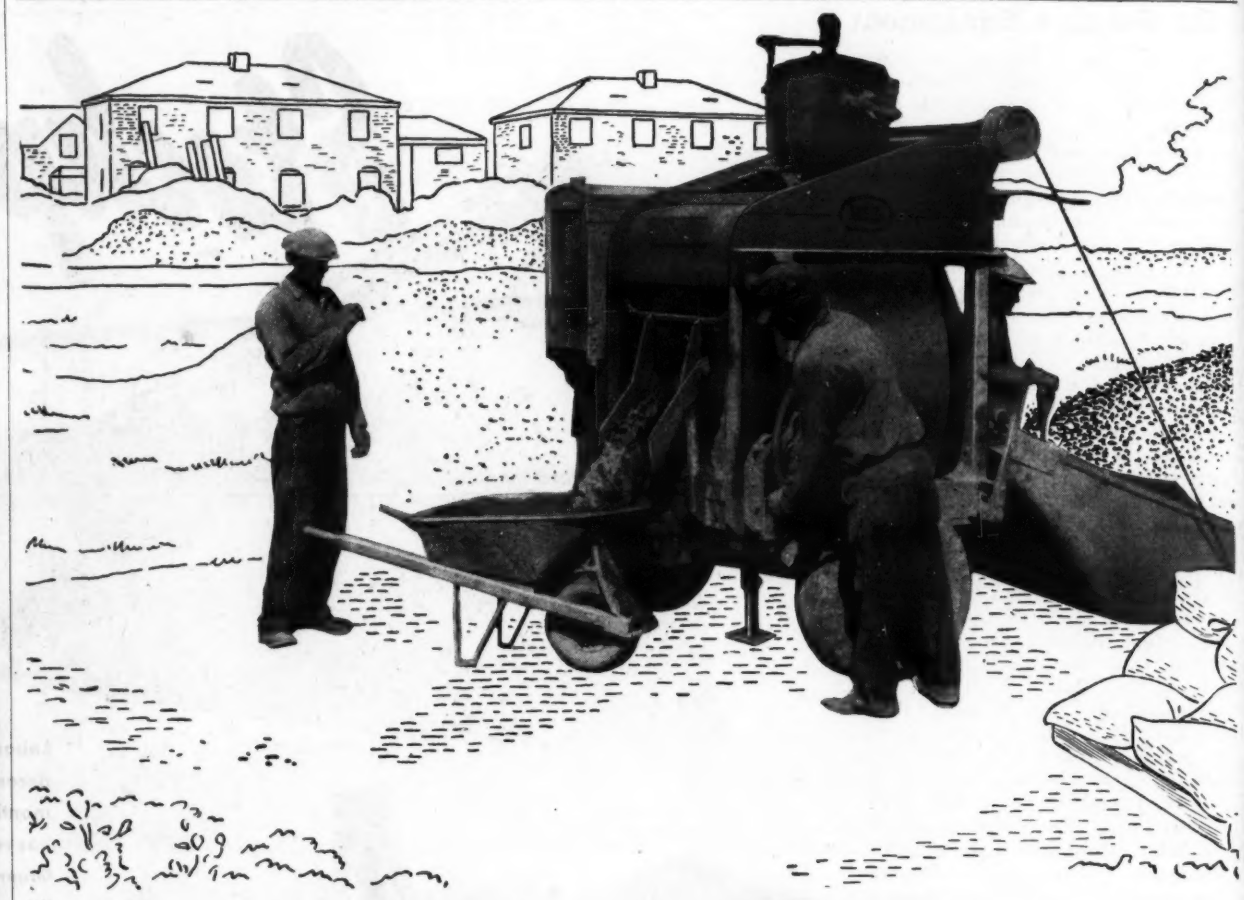


The Dodge portable tool board used at the U. S. Forest Service Equipment Depot at Arcadia, Calif.

Automotive Repair Shop

South of the north line of buildings

(*Continued on next page*)



Tomorrow Means Today...

WITH REX MIXERS

"TIME SAVERS!" That's what users call the Rex mixers. And time-savers are just exactly what these husky mixers are. With their much faster charging and their 6 to 7 second discharge, they get the jobs done faster . . . more economically. With Rex Mixers, you can change *tomorrow* into *today* on the schedule.

There are a lot of other exclusive features, too! Water control is practically 100% accurate . . . drum heads are pressed steel, die formed and welded integrally with the center sheet, eliminating pounds of excess baggage . . . the accurately formed track and rollers support the load without distortion and maintain perfect alignment through years of tough service, develop no flat spots. And the one and only chain belt drive cushions shocks—prolongs mixer life. Those aren't all! Rex mixers have other exclusive features . . . all designed to give you faster, more economical service.

Investigate Rex Mixers—See how they can help you do the job faster at lower costs. And check the other equipment in the Rex line: Moto-Mixers, to speed the mixing, hauling and placing of concrete . . . Pavers, that can give you really heavy yardage production, faster . . . Pumpcretes, that pump concrete by pipe line . . . Pumps, that move water economically and efficiently. Get the complete story. See your Rex Distributor or write Chain Belt Company, 1666 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT COMPANY
of Milwaukee

REX CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO-MIXERS MIXERS

Proved Again...
"CLEVELANDS" DURABILITY

● Just as CLEVELANDS proved their durability on tough ditching jobs throughout the nation before the war—so have they been consistently proving this durability on war jobs, both here and abroad.

If you are now a CLEVELAND owner, you are fully appreciative of this valuable CLEVELAND characteristic. If you don't now own a CLEVELAND be sure to apply for full particulars at your nearest CLEVELAND distributor or direct to the factory before purchasing your next ditcher.

CLEVELANDS will always give you the durability so necessary for successful ditching jobs.

THE CLEVELAND TRENCHER COMPANY

Care of Equipment Is Well Organized

(*Continued from preceding page*)

and west of the locker room is the main automotive repair shop, a stucco-on-steel-frame building 60 x 120 feet in size, entered through 12-foot Wilson roller overhead doors in the east and west sides and south end of the building. The single door on the west opens into a frame black-out tunnel 20 feet long. The north 20 feet of this building is used for the dispatcher's office, a washroom, and the motor-overhaul shop.

In the dispatcher's office a wall board with hooks for variously colored tags shows at a glance the location of all assigned equipment for which the depot is responsible. This board supplements the card index system provided to show the same information with additional data, and has proved to have a salutary psychological effect on the operating personnel.

In the motor-overhaul shop are three Canedy-Otto motor stands, a shop-built rolling crane with a hand winch for moving motors undergoing repair, and a tub with a screen rack in which Stoddard solvent and air blast are used for cleaning small parts. This shop also has a Kwik-Way valve-facing machine and seat grinder, a Kwik-Way boring bar, a Sunnen Model L grinder with all attachments, and a Ryco connecting-rod aligner. In cabinets along the east wall are manufacturers' special tools, and a complete set of expansion reamers. On the work benches under the north windows are a South Bend bench lathe, a bench grinder, and a hand-operated Greenerd arbor press, as well as a speedometer tester and a complete electric test board built up in the shop.

Entering the large open section of the automotive building from the motor-repair room, we found a busy shop in which no stationary work benches are used. Rolling-stand work benches are moved as needed to the scene of operations, as are rolling special-tool boards which contain manufacturers' specialized tools. In the northeast corner is a Curtis lift used when lubricating equipment with pressure outfits.

Just south of this department are an Echlin electrical tune-up bench and a Champion spark-plug testing machine. Next is a Shepard-Thomason brake-lining machine and a shop-built pressure machine for testing diesel injection valves. A Caterpillar track-pin press on a rolling carriage is stored in the southeast corner, with a Van Dorn 10-inch bench grinder mounted on a pedestal nearby. A Chicago-Pneumatic Power-Vane wrench with ¾ to 3½-inch sockets is available. Along the west wall are a Buffalo drill press, various circular revolving metal bolt and parts trays, a Bear axle straightener, a Speaker electric tube vulcanizer, and a Manley 60-ton hydraulic press.

Near the center of the south end of the shop is a Southwest Welding & Mfg. Co. crane consisting of a stationary vertical post on which is mounted a 20-foot horizontal boom with full-circle swing, with a Wright rolling chain hoist of 5-ton capacity.

Other Services

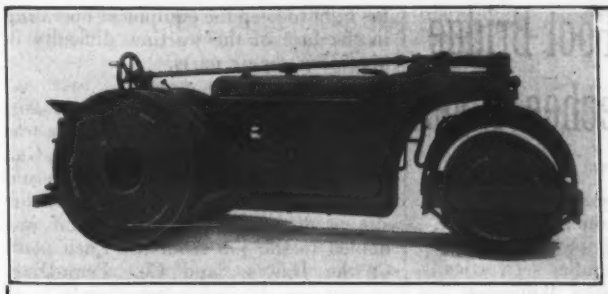
In an open shed 48 x 100 feet in size, located southeast of the automotive shop, a salvage crew checks each part or assembly which has been replaced and removes any usable portion before the remainder is delivered to the scrap piles. In two bays of this building a Graco Convoy Luber mounted on a Ford truck takes care of the lubrication of machines too heavy for the regular lubrication rack. Two drums of track roller grease, and one each of chassis and gear lubricant, as well as three drums of motor oil, are carried on this truck which is often used away from the depot.

Another field service unit which has been found most helpful is a 1½-ton Chevrolet truck equipped with racks for carrying welding-gas tanks; lockers for a chain hoist, torches, tools, and parts; and a collapsible metal shear frame which can be erected and used as a crane for handling heavy assemblies in the field.

Volume and Variety of Work

In 1943 the Arcadia Equipment Depot area performed $673,000 of repairs, including work done for Government agencies other than the Forest Service. Because of the volume of work handled and the necessity of having maintenance equipment ready for service on March 1 and fire-fighting equipment completely repaired by May 1, much advance planning and scheduling is essential. Branch shops submit a monthly equipment-status report which shows work

(*Concluded on page* 83)



What's *different* about this THREE-WHEEL ROLLER ?

The wheels (rolls) are cast *hollow* and are fitted with portholes so they can be filled with water or sand—thus increasing the weight of the roller to produce more ground pressure when needed—a very desirable feature.

Variable Weight—that's the answer!

Other important features are its *ruggedness*, its *easy steering*, its *clear vision*, and *operator-comfort*.

FOUR SIZES: 4-5 ton, 5-8 ton, 8-10 ton, 10-12 ton. WRITE FOR LITERATURE.

Manufactured by

J. E. INGRAM EQUIPMENT CO., 1146 W. Laurel St., San Antonio 6, Texas

Bulldozers are not fighting equipment. They pack no artillery—they have no protecting armor plate. They don't even enjoy pet names like "Lulu Belle" or "Memphis Mamma," but they are in there—pitching!

Baker Bulldozers are doing all right backing up the Yanks in every theater of war. You will find them right behind the fighting men — filling shell holes—leveling cratered air fields—excavating for underground oil tanks and ammunition dumps—building landing docks—digging drains and foxholes—making themselves useful to the fighting men. Their aid in consolidating positions on beach heads, mountain sides or sand dunes is hard to over-estimate.

Commanders of task forces have learned that it is almost as important to have bulldozers as tanks in the holds of their LST ships. Bulldozers have won their spurs and Baker Bulldozers, because of their fast, positive hydraulic control, dependability and rugged design stand high on the honor roll.

It's true that supporting our fighting forces is a full time job for Baker Bulldozers *NOW*. But just as soon as our enemies are vanquished, you will find the Baker ready to perform equally notable feats on your contracts. Send for a copy of "Unsung Heroes of War."

THE BAKER MFG. CO.
585 Stanford Ave.
SPRINGFIELD, ILL.

BULLDOZERS SNOW PLOWS BAKER CONSTRUCTION EQUIPMENT

New 1,344-Foot Bridge Over Ogeechee River

(*Continued from page 27*)

of ¼ inch per foot, spaced 27 feet apart and connected by a concrete web wall.

Forms for both types of columns were made up of 2-inch lumber set vertically and lined with Masonite. Battens of 2 x 6-inch lumber were set at 16-inch centers and held in position by 8 x 8-inch vertical wales set at the corners and held firmly by Medco form clamps on ½-inch rods. The tops of the column forms were guyed to buried deadmen with ½-inch cable adjusted by turnbuckles.

The web-wall forms were 2-inch tongue-and-groove lumber set horizontally with double 2 x 6-inch vertical studs on 16-inch centers and tied through the wall with ½-inch rods and Medco form clamps. They also were lined with Masonite to improve the finish and reduce the amount of rubbing necessary after the forms were pulled.

Superstructure

Five 6-pile bents were driven and capped with a 10 x 10-inch timber to support the girder and deck forms. These, with capped posts set on the column footings adjacent to each concrete bent, separated the 42-foot span between columns into six short spans for the erection of the girder bottoms. Two 4 x 8-inch stringers were used under each concrete girder on these short spans. The 4 x 8 stringers rested on 10 x 10-inch blocks which had two 4 x 6-inch blocks and take-up wedges between them and the falsework caps.

The girder sides and floor forms were built in sections, using 2-inch tongue-and-groove lumber and carried on 2 x 6-inch ribs at 16-inch centers. Where surfaces were to be exposed to view in the finished structure, the forms were lined with Masonite.

Two skid stiffleg derricks with 2-drum hoists and gasoline engines handled the erection and stripping of forms for the superstructure. An arrangement proving useful at times was a 5-ton Beebe hand hoist mounted on one of the stiffleg derricks in addition to its Waukesha-powered 2-drum hoist. As the stripping of forms progressed in conjunction with resetting them ahead, the stifflegs were often used to load the stripped form sections at one handling directly onto trucks standing on the completed bridge deck.

A Durex saw powered by a LeRoi gasoline engine was used for cutting and fitting form lumber. A P & H-Hansen Weld-It-Well arc welder mounted on an old Buick frame aided the contractor in his fight to keep the equipment operating in the face of the wartime difficulty in obtaining repair parts.

Concrete

Coarse aggregate for the concrete was shipped to Eden from the Cammack, Ga., plant of Wesson & Booker, there unloaded by hand and trucked to the bridge site, a distance of 2 miles. Sand was hauled to the job from the Eden plant of the Dawes Sand Co. Penn-Dixie cement was shipped in paper sacks from the Clinchfield plant to Eden and transported to the bridge site by the contractor's trucks. Water was pumped from the Ogeechee River to the mixers by a Rex Speed Prime pump. The batches, which consisted of two sacks of cement, 371 pounds of sand, and 610 pounds of rock, were mixed in either the Rex or Ransome 10-S mixer located side by side on the approach fill or adjacent deck. On large pours both mixers were used. Batching was done by hand, with the wheelbarrows weighed on either the Fairbanks or Winslow wheelbarrow scales which the contractor moved about as needed on the job.

The fact that most of the ground adjacent to the bridge was accessible to trucks and suitable for the movement of equipment permitted extreme flexibility in the pouring operations. Mixers and scales could be spotted at the most convenient locations, aggregates and cement hauled in where needed and the mixed concrete delivered to the forms by concrete carts or in buckets lifted by one of the three Northwest cranes or either of the two stiffleg derricks. On the deck pours, use was made of a steel trussed screed for longitudinal finishing. It was fabricated on the job of angles and steel rods with turnbuckle adjustments. This implement was long enough to strike off the entire deck between joints without the use of intermediate bulkheads. The outside girder which supported the sidewalk was not poured until after the deck, although the forms were built at the same time. This procedure eliminated much of the trouble usually encountered in securing proper line and grade on the curb line and sidewalk and resulted in a pleasing appearance on this portion of the job.

Major Quantities and Personnel

The principal bid quantities involved in this contract were as follows:

Class A concrete	3,515 cu. yds.
Reinforcing steel	707,000 lbs.
Structural steel	206,500 lbs.
Structural excavation (all types)	2,900 cu. yds.
Untreated-timber piling	20,000 lin. ft.
Concrete hand-rail	3,038 lin. ft.
Seal concrete	200 cu. yds.

This contract for a 1,344-foot bridge over the Ogeechee River was awarded by the State Highway Board of Georgia to H. G. Smith of Fitzgerald, Ga., on his bid of $446,838.79. Wartime priorities delayed the construction so seriously that the allotted working period had already expired at the time of our visit to the project, although the construction was less than 75 per cent complete. J. P. Byrd was Superintendent for the contractor and J. G. Brock was Bridge Resident Engineer for the State Highway Board of Georgia.

PILE HAMMERS and EXTRACTORS

HOISTS—DERRICKS WHIRLERS

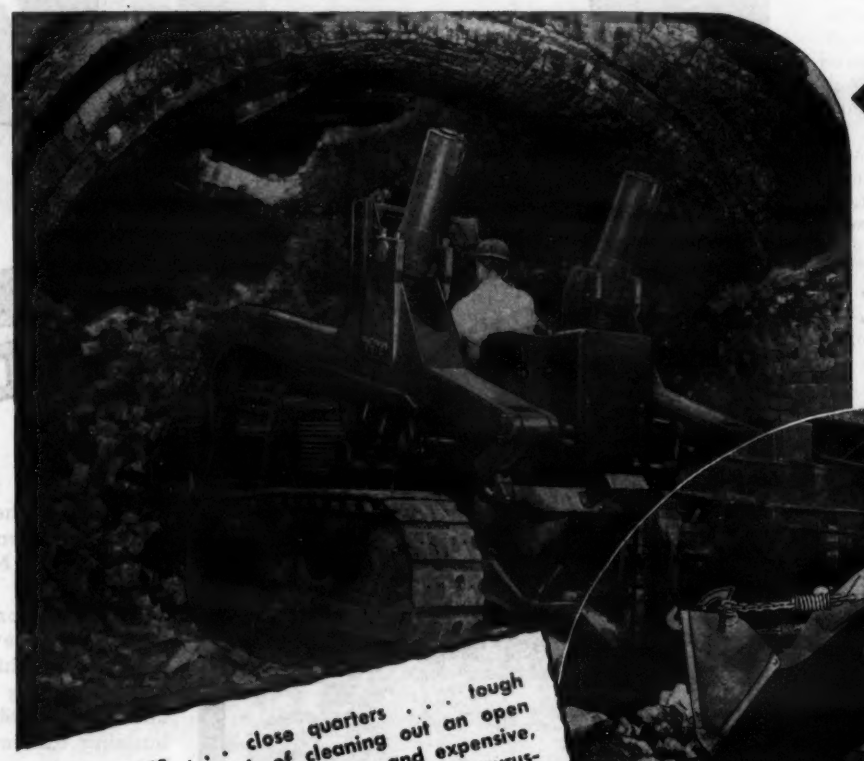
Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York

Distributors in Principal Cities

The Bucyrus-Erie DOZERSHOVEL GETS IN... AND DIGS!



There's plenty of room all around as this Dozershovel moves into the low, narrow archway to pick up a big load of bricks . . .

. . . It carries the load to the spoil pile, dumps, then returns to repeat the operation — in a profitable hurry.

Low clearance . . . close quarters . . . tough digging . . . The job of cleaning out an open hearth furnace was painfully slow and expensive, for it had to be done by hand — until a Bucyrus-Erie Dozershovel went to work on it. Then things were different, because the Dozershovel's low overall height allowed it to move right in under the arch, its powerful digging action let it take big bucket loads, its maneuverability permitted easy going from furnace to spoil pile. This important war job could now be done fast, economically, profitably.

This is just one of the many unusual jobs, hitherto done by hand, that the versatile Dozershovel handles efficiently. In addition to the unit's use as a shovel, a quickly interchangeable dozer blade permits full-fledged dozer service, and a hook on bucket or blade provides for utility crane application. Get the complete story of this new unit for T9 and TD9 International TracTracTors from your International distributor.

W-45

BACK THE ATTACK!
BUY WAR BONDS

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

The new Wood Model 54 Roadmixer in action. The travel speed of the tractor and the mixing action of the Roadmixer are synchronized.

New Road-Mix Unit Now in Production

Featured by a 25 per cent greater mixing capacity, the new Model 54 Wood Roadmixer, a complete traveling mixing plant recently developed by the Wood Mfg. Co., 816 W. 5th St., Los Angeles 13, Calif., is now in full production. The increased mixing capacity of this new machine has been obtained by increasing the diameter of the mixing drum from 48 to 54 inches. According to Wood engineers, this larger-size drum not only cuts down friction resistance within the drum but also enables the handling of larger windrows. Where formerly windrows up to 6 cubic feet were handled, the new Roadmixer can now take windrows up to 8 cubic feet, it is reported. This cuts down the number of windrows needed for a particular job, thus saving time. For example, the manufacturer states that the new Roadmixer can build a 20-foot highway 3 inches thick with one windrow in one pass.

The new machine also features a power lift which, through four hydraulically operated jacks, provides almost instant lifting of the drum and cutting blades, either in the windrow or at the end of the pass. This power lift supplements the manually operated lifts which are used for fine adjustments during mixing. Faster and easier application of the cutting blades to grade is claimed to have been obtained by increasing the size of the plungers on the jacks. In place of a full-length axle under the mixer, stub-end axles have been substituted. Oversize single-tired wheels have replaced the dual wheels, and the wheels have been moved forward to give a better distribution of weight between the tractor drawbar and wheels. This has also provided a shorter turning radius which allows the mixer unit to get out of and into windrows more quickly.

The basic operation of the new Wood Roadmixer remains the same as that of previous models. A standard crawler tractor pulls the Roadmixer and, through a combined power take-off and transmission, drives the mixing mechanism at the proper travel speed. A binder supply truck is attached immediately behind the mixer, and the binder is pumped from the supply truck and delivered under pressure through spray nozzles into the mixing drum. Gaged pressure and accurately metered volume are designed to insure the correct mix. Travel speed and mixing action are synchronized. A crew of two men can usually handle a complete Wood Roadmixer unit.

IN THE high tide of invasion, east and west, thousands of International Diesel Tractors are serving the Army, the Navy, the Marine Corps, and the Air Forces. On many a battle-front these tractors play a fighting part in the drama of tanks and ships and fighting men.

Take Guadalcanal. In the tense hours of that first invasion it was *do or die* on the airstrip. International Diesels went ashore with their bull-dozers . . . filled in craters as fast as enemy bombs dug them . . . did combat duty to help the Marines cling to the toehold that gave us Henderson Field. Many a tractor operator died there, under fire, but the great Pacific Offensive was on.

It is the year of decision—overseas and over here. This year many thousands of tractor operators on the home front will come to close grips with the warning: *Take care of that equipment! Make it last! Make it do!* Harvester and the International Industrial Power Distributors stand ready to see you through. If your need for new equipment is vital to the war effort, we will have equipment for you. If your need is less vital, we will safeguard your present International Power with every service aid at our command.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

Fight with your blood—Give to the Blood Bank *Fight* with your money—Buy EXTRA Bonds *Fight* on the home front—Stay with that War Genius *Fight* the hidden enemy—Fight INFLATION!

INTERNATIONAL HARVESTER
Power for Victory

PUNCH-LOK
Streamlined
HOSE BANDING METHOD

SPEED-SAFETY-ECONOMY
In Clamping-Splicing-Repairing-Mending-Tieing-Reinforcing

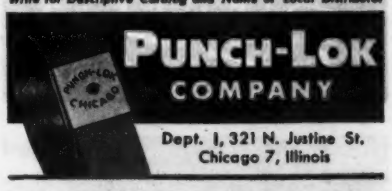
PUNCH-LOK Streamlined Hose Banding Method is being used in hundreds of production and maintenance jobs in all industries for connecting high-pressure hose; splicing electric cable; stopping leaks in steam and water lines; reinforcing and mending splits in cross-arms and ladder rails; tieing rigid conduit or flexible cable to existing pipe lines or girders; tieing ends of wire or manila rope to prevent fraying—and many other jobs. PUNCH-LOK is giving wartime industries a fast, safe, economical, quality banding method. Investigate NOW the many advantages it will have for you in your present and postwar work. Let PUNCH-LOK solve your clamping or banding problems!

CLAMPS . . . Made of flat, high tensile, galvanized steel, double wrapped. Available from ⅜" to 48" I.D. Any large size clamp can be pulled down and made into a smaller size.

LOKING TOOL . . . Sturdily constructed to assure long life. Locks all size clamps with a tensional pull of 1,000 lbs. Hammer punches and breaks excess band flush at clip.

GROOVED FITTINGS . . . For water or steam lines. Permits application of high pressure clamping without damage to hose.

Write for Descriptive Catalog and Name of Local Distributor



PUNCH-LOK COMPANY
Dept. I, 321 N. Justine St.
Chicago 7, Illinois

Change of Address
(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York 16, *today*)

From _____
(Former address)
_____
_____
To _____
(New address)
_____
_____
Name_____
Firm_____
Position_____

Fresno River Siphon Recently Completed

Oberg Bros. Pouring This Portion of Madera Canal Encountered Difficulties With Underground Water

(*Photos on pages* 1 *and* 84)

✦ SCHEDULE 2 of Specification 1054 for the Madera Canal, under which the Bureau of Reclamation awarded a contract in 1943 to Oberg Bros. of Inglewood, Calif., provided 400 calendar days for the construction of a siphon under the Fresno River, with inlet and outlet transitions and a wasteway for the discharge of irrigation water, on the Central Valley Project in California. Despite difficulties encountered, the work progressed satisfactorily and water will be delivered through the wasteway this month.

The overall length of the structure is 1,025.5 feet, which includes the approach transitions, the wasteway discharge opening, and 761.5 feet of closed siphon of which 42 feet is utilized for the two square-to-round transitions and the remainder is circular and 10.5 feet inside diameter. Walls of this portion are 11 inches thick reinforced with ½ and ⅝-inch hoops, ⅞ and 1-inch segmental bars, and ½-inch longitudinal steel.

Diversion and Excavation

Diversion of the surface flow of the Fresno River was accomplished without serious difficulty by the excavation of a diversion channel, but subsurface flow proved more obstinate. Before the volume could be reduced sufficiently to permit excavation and concrete placing to be completed, it was necessary to intercept the flow by wells 10 feet apart in a line parallel to and 30 feet downstream from the siphon barrel. These wells, cased with 12-inch perforated corrugated-metal pipe and filled with porous gravel, were carried to 10 feet below the bottom of the excavation for the siphon barrel. They were connected, in groups of five, to 6-inch Gorman-Rupp self-priming centrifugal pumps which were set in a trench excavated alongside the line of wells in order to reduce the suction lift and increase their efficiency. With the water successfully diverted, excavation was completed by a Northwest crane using alternately dragline and clamshell buckets of 1½-cubic-yard capacity. The final dressing was done by hand.

Concreting

Concrete foundation blocks were poured in place at 6-foot 3-inch intervals, with steel rods projecting from their tops which were set accurately to grade to support the inside barrel form for the siphon. These forms were built in sections of 4-inch center-matched lumber nailed longitudinally to 2 x 8 ribs cut to the proper radius. Each section was 6 feet 3 inches long so that four identical sections formed the 25-foot length of barrel between expansion joints. The sections were built so that two, each forming approximately 165 degrees of circular arc, were butted at the top of the barrel while two more, with their ribs cut diagonally to facilitate placing and removing, formed the bottom 30-degree portion of the circle.

Forms were cut and built at a yard adjacent to the scene of operations where a Beach bench saw and a band saw powered by a Wisconsin engine cut the lumber. The outside forms for the siphon barrel were erected in sections of similar size and braced to the banks of the excavation by horizontal struts.

Cement was furnished by the Bureau of Reclamation after manufacture to its modified specifications by the Monolith Portland Cement Co., shipped to Madera by rail, and trucked from there to the job by the contractor. Both sand and gravel were trucked 25 miles to the job from the plant of the Grant Pacific Rock & Sand Co. Water was obtained from the contractor's unwatering system. The aggregates were proportioned by weight on wheelbarrow scales, and mixed in 3-sack batches. The con-

(*Concluded on page* 73)

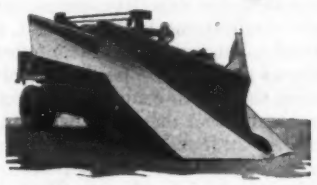
HYDRAULIC
ROOT
F-33 SCRAPER

Note the adjustable spring cushion and the full-height curved moldboard

Write for circular giving full details.

ROOT SPRING SCRAPER COMPANY
KALAMAZOO 11, MICHIGAN

Foresight Pays DIVIDENDS
—MANY
DAVENPORT-FRINK SNO-PLOWS



—performed their snow clearing functions without a hitch last winter BECAUSE their owners anticipated their repair needs EARLY and were READY when the snows came. We suggest equal foresight for next winter. It will be a pleasure to supply the Sno-Plow repair parts you will need for top efficiency.

DAVENPORT BESLER CORPORATION Dept. A DAVENPORT, IOWA
Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK

Information Please!
QUESTIONS AND ANSWERS ABOUT
DOUGLAS FIR PLYWOOD
—your most versatile building material

QUESTION—What are the Standard Types of Douglas fir plywood?

ANSWER—Douglas fir plywood is manufactured in two standard types—moisture-resistant and Exterior.

●

QUESTION—What is the basic difference between these two types?

ANSWER—In the moisture-resistant types plies are held together almost always by protein glues; in the Exterior type the veneers are bonded together with a synthetic resin that is completely and permanently waterproof.

●

QUESTION—Where should Exterior types be used?

ANSWER—For all permanent outdoor uses, such as for house siding, marine construction, or garden furniture; and for interior uses where conditions of extreme humidity may apply, as, for instance, in a shower room.

●

QUESTION—Are moisture-resistant grades intended only for interior uses then?

ANSWER—In general, yes. However, certain grades of this type may be used for wall and roof sheathing, or sub-flooring, which are not strictly interior uses. Furthermore, a special grade of moisture-resistant type (see below) is made for use as concrete form material.

●

QUESTION—Within these types, how many grades are offered?

ANSWER—Moisture-resistant type plywood is available in four grades—Plypanel (in two appearance grades) for paneling cupboards and other built-ins; Plywall for walls, ceilings and partitions; Plyscord for sheathing and sub-flooring; Plyform for concrete forms.
Exterior type is available in several appearance grades similar to those offered in the moisture-resistant type. Sound 2 Side and Sound 1 Side are the most popular.

●

QUESTION—How can I be sure of getting a particular type or grade of Douglas fir plywood?

ANSWER—All standard types of Douglas fir plywood are "grade trade-marked." Every panel is stamped for easy identification. The various official grade trade-marks are pictured at the right.

●

QUESTION—What are the performance tests for Douglas fir plywood?

ANSWER—All Douglas fir plywood must meet the rigid performance tests outlined in Commercial Standard CS-45-42, published by the Bureau of Standards of the U. S. Department of Commerce.

●

QUESTION—What is the test for Exterior type Douglas fir plywood?

ANSWER—Random samples taken from production runs are subjected to the boiling test described in CS-45-42. Briefly, they are boiled in water for four hours; dried for 20 hours at high temperature; boiled another 4 hours. While still wet samples are mechanically pulled apart in a glue-line testing machine. Examination of the specimen must show that the bond between the plies is stronger than the wood itself.

●

QUESTION—What about tests for moisture-resistant types?

ANSWER—Naturally they are less severe. They require that samples must retain their form and most of their strength when occasionally subjected to cycles of thorough wetting and drying.

●

QUESTION—What technical data concerning Douglas fir plywood is available?

ANSWER—The following booklets and publications are available without charge from the Douglas Fir Plywood Association, Tacoma 2, Washington:
ENGINEERS HANDBOOK "Technical Data on Plywood" CS-45-42 (This is also included in the Handbook) WALL CHART, listing standard thicknesses, widths and lengths by types and grades.

●

QUESTION—What other sources of information are there?

ANSWER—Additional information may be secured from the U. S. Forest Products Laboratory and the Bureau of Standards, as well as from the field organization or the Technical Department of the Douglas Fir Plywood Association.

●

QUESTION—Is Douglas fir plywood available now?

ANSWER—Because of its many advantages, Douglas fir plywood is being used extensively in all types of war production. For the present, Douglas fir plywood is allocated by the War Production Board only for direct war uses. When the need is less urgent, Douglas fir plywood will again be available to help you build better structures—faster.

●

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

Official Grade Trade-Marks

PLYPANEL D.F.P.A.
TRADE MARK REG. U. S. PAT. OFF. PEND.
These words appear on the edge of every genuine PLYPANEL grade panel.

GENUINE PLYSCORD SHEATHING D.F.P.A. INSPECTED
This stamp appears on the face of every genuine PLYSCORD grade panel.

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED
This stamp appears on the face of every genuine PLYFORM panel.

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED
This mark is stamped on the back of every genuine PLYWALL panel.

EXT.-D.F.P.A.
TRADE MARK REG. U. S. PAT. OFF. PEND.
These words appear on the edge of every panel of genuine EXTERIOR type Douglas Fir Plywood indicating that it is suitable for permanent exterior use.

DOUGLAS FIR PLYWOOD
Real Lumber
MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

Folder Describes New Line of Paving Breakers

The Syntron self-contained gasoline hammer, designed for one-man operation, and the line of auxiliary tools for use with the hammer for breaking pavement, cutting asphalt, drilling rock and similar operations, are described and illustrated in a four-page folder issued by the Syntron Co., 227 N. Lexington Ave., Homer City, Pa. The hammer consists of a single-cylinder air-cooled 2-cycle engine having two pistons, one of which actuates the flywheel magneto and cooling fan, and the other, actuated by the explosive pressure, delivers 2,000 blows per minute on the shank of the tool.

Copies of this folder are available to interested highway engineers and contractors upon application to the manufacturer and mention of this review.

New Lidgerwood Catalog Describes Line of Hoists

Complete details of the Lidgerwood line of steam, gasoline, diesel and electric hoists, including derrick hoists for hook and grab bucket work, with and without swinging gear, are given in the new Bulletin No. H-212 which has just been issued by the Lidgerwood Mfg. Co., Elizabeth B, N. J. Featured in the bulletin is the special utility hoist for material handling or pile driving, with a maximum rope pull of 4,500 pounds on a single line at 175 feet per minute initial rope speed, with one or two drums as required. A number of hoists are illustrated, and general specifications are given covering the entire line. Included also are illustrations of hoisting and conveying cableways and cableway hoists which are described in a separate bulletin, No. C-111.

Copies of this literature may be secured by request to the manufacturer and mention of this magazine.

Aldrich Leaves Bros Co.

J. D. Aldrich, who for the past eleven years has been Sales Manager of the Road Machinery Department, Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn., has resigned from that company. During this period, he has traveled extensively covering construction projects and visiting contractors throughout the entire United States, Canada, and Mexico. Mr. Aldrich's plans for the future are not yet decided.

First-Class Fighting Machine

TALK to a fighting man back from battle and you'll hear him speak of "Caterpillar" Diesel equipment with affection. He knows that, out there, when they need "workpower" they count on "Caterpillar" Diesels. War dramatizes the dependability of these husky power-plants. For a single power failure may cost lives.

It was in the years before the war on the highways, on construction jobs, in logging camps and oil fields and on farms that "Caterpillar" Diesels matched their dependability against the toughest kinds of jobs that could be found.

Through those years, the men who built them were watching them perform. Owners of "Caterpillar" equipment were urged to give it more and harder work to do. After many thousands of hours of service, engines were torn down and studied. At the first sign of an on-the-job weakness—no matter how slight—"Caterpillar" trouble-shooters went after it . . . *and corrected it!*

So, when the armed forces asked for dependable power, it was just a question of stepping up production of the same machines which had been proved over so many years.

When the war is done, the biggest production of "Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets in all history will be ready to tackle the countless tasks that peace will bring. They won't be streamlined "dream" models, but they will be modern, battle-tested "Caterpillar" Diesels—the same kind that are with our troops around the world today.

Meanwhile, your "Caterpillar" dealer is equipped to render complete and efficient service to help keep your present "Caterpillar" equipment on the job—working at peak efficiency.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

TO WIN THE WAR: WORK—FIGHT—BUY WAR BONDS!

Machine Spray Unit For Slope Seeding

(*Continued from page 9*)

down to 12 inches effective width by canvas side boards to prevent the earth falling over the edge of the conveyor belt and sticking on the back of the returning belt. A quick-acting valve in the goose-neck pipe from the pump to the distributing hose makes it possible to shut off the spray quickly and prevent waste of material.

This effective assembled unit, which can be placed on any 3 to 5-ton flat-bed truck, is made entirely of salvaged material with the exception of the U-shaped wooden agitator tank which was built from new lumber in the early months of 1943. To keep the outfit supplied with water a Bean spray tank is used as a booster.

Prior to the use of the machine, the most economical method of establishing turf on mulched slopes was to place sufficient loamy topsoil over mulch to furnish a good seed bed, and seed and fertilize by hand. This method cost about 20 cents per square yard. Just as satisfactory turf can be established by the machine method at a cost of about 3 cents per square yard.

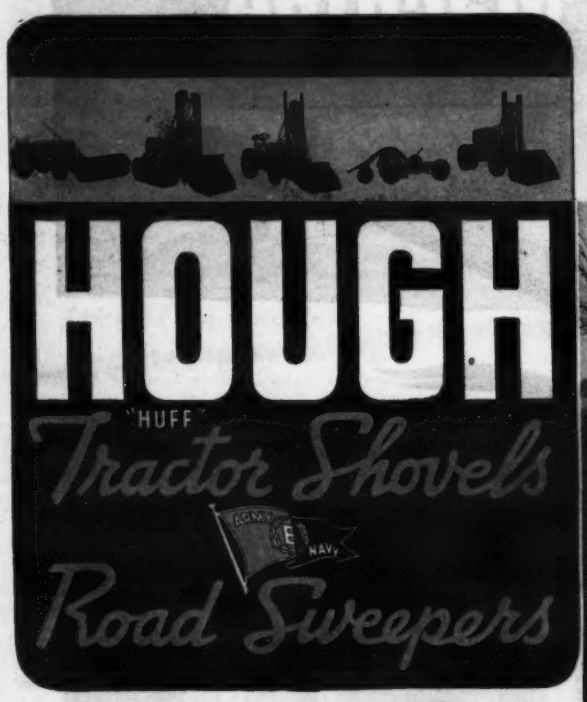
New Weld-Testing Machine Is Portable

Two of the features of the new improved portable weld-testing machine just announced by the Air Reduction Sales Co., manufacturer of gas and arc welding equipment and supplies, are its ability to provide accurate data on tensile strength and ductility of weld specimens, as determined by three weld tests; and, secondly, its relatively light weight which enables users to perform weld tests right on the job. This latter feature makes the machine particularly useful on pipe-line installations, construction, and similar work performed in remote locations.

The three weld tests performed by this machine are: (1), the reduced section transverse tension test; (2) guided bend test (a complete 180-degree face or root bend); (3) longitudinal all-weld metal tension test (0.505 inch). The machine operates on the principle of the hydraulic jack. A hand-operated pump transmits pressure through a hose to the plunger. While the maximum direct load is 40,000 pounds, the use of reduced section specimens permits tests on metals of 150,000 psi or higher tensile strength.

Jaws for making the transverse tension test, and plunger and die for the guided bend test are supplied with the machine, while jaws for the longitudinal all-weld metal tension test are furnished on special order. All standard equipment is installed in an oak cabinet which serves as a practical container for storage and shipment. The cabinet has handles at either end to facilitate carrying.

An illustrated booklet, ADI-889, describing the construction and operation of this new Airco machine may be secured direct from the company, 60 E. 42nd St., New York 17, N.Y. Just mention this item.



Smooth

Operation—

a Feature of
Hough Cable-Operated Tractor Shovels
which imparts Speedier Handling, Greater Yardage and Lower Costs

Smooth, easy operation, made possible by proper weight distribution and sound engineering design, is a valuable characteristic of Hough Cable-Operated Tractor Shovels on International T-6, TD-6, T-9 and TD-9 Tractors. Owners report that operators have confidence in their machines, and have a welcome tendency to speed up the work, resulting in more material moved at a lower cost per yard.

Specifications include: automotive type main drive from engine crankshaft through hardened steel gears and propeller shaft equipped with universal joint; control lever raises, holds and lowers bucket; safety stop prevents overwinding cables; dumping clearance 7′; raising time of loaded bucket 9 seconds; lowering time only 2 seconds. Bucket capacity for T-9 and TD-9, ¾ yd.; for T-6 and TD-6, ½ yd.

Shipped completely mounted—ready for operation. Ask your International dealer or write for bulletin.

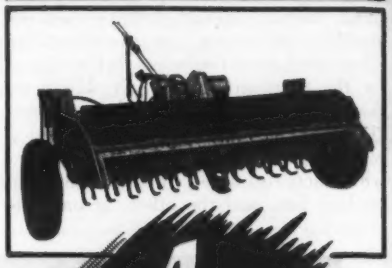
Can be converted to Bulldozer in less than 10 Minutes

The bucket can be readily removed and a bulldozer blade attached. Both straight and reversible blades are available. Blades are equipped with hardened reversible cutting edges. Mushroom type grading shoes are standard equipment. Blades can be quickly set for bulldozing straight ahead or angled to right or left. Ruggedly constructed for tough bulldozer service.

THE FRANK G. HOUGH CO.
Libertyville, Illinois
"Since 1920"

Over 3,500 Hough Tractor Shovels Now in Service

ARIENS AGGMIXER



A THOROUGH JOB OF PULVERIZING AND MIXING for MIXED-IN-PLACE CONSTRUCTION

ARIENS Aggmixer operates in connection with other general purpose road equipment. It does the job thoroughly, rapidly and economically with whatever aggregates and binder are used, such as all types of bitumens, cements, clays, chlorides, etc. Easy and safe to operate . . . adjustable to any tractor . . . hydraulic adjustment for depth is simple and positive. Complete information upon request.

ORDNANCE — UNITED STATES ARMY
ARIENS COMPANY
BRILLION, WISCONSIN

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York 16

Enclosed is my remittance of $2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

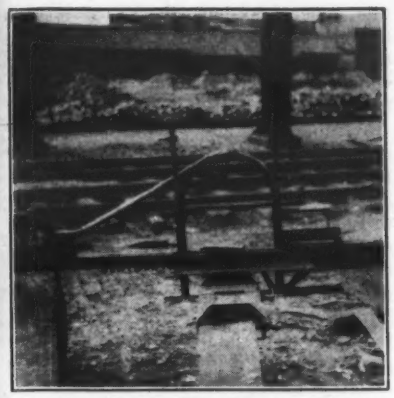
Name_____

Position_____
(Or Type of Business)

Address_____

(City)_____

N. B., Cash, check or postage stamps will be entirely acceptable.



A job-built template for use with a Davey pneumatic saw to speed up quantity cuts of the same type.

Template Aids Cutting Timber with Air Saw

A template developed by a contractor in the field for use with a Davey pneumatic saw makes possible the mass production of any cut that can be made with a hand saw, according to a recent announcement from the Davey Compressor Co., Kent, Ohio. The template, shown in the accompanying illustration, can be easily fabricated from light structural steel or from steel plate, and is fastened to the timber section or log with conventional carpenters' clamps and then adjusted to the angle desired.

Carrying the operating frame of the saw, the template acts as a guide to obtain a quantity of identical straight-cut, square or angle cuts, functioning in a similar manner and performing the same service as a carpenter's miter box. In a few instances, the template has been clamped to the saw itself, so that it forces an identical application of the saw time after time to obtain quantities of the same cut. However, the most usual use of the template is in the manner first described.

The use of the pneumatic saw is saving time and man-power for contractors throughout the country, particularly in cribbing, shoring, piling work, and in many other construction jobs, say executives of the Davey company. One contractor reports that twenty-five 10-inch creosoted piles were cut off only 3 inches above grade in 1 hour and 35 minutes, while on another job, thirty-six 12-inch piles were cut in 3 hours and 5 minutes, with the Davey saw operating half in and half out of the water. The report continues that it would have taken three to four days to cut these green piles with a two-man hand saw.

An illustrated folder E-163, with further details on the features of the Davey pneumatic saw, which include speed, flexibility, ease in use, durability, and the ability to operate under water, may be secured by those interested direct from the manufacturer. Just mention this item.

New Safety Goggles

Two new types of AO Ful-Vue acetate safety goggles, with and without side shields, have been put on the market by the American Optical Co., Southbridge, Mass. They are light-weight and designed to fit snugly without slipping. Sturdily constructed of spark-proof material, with bridge and nose pads of extra heavy stock and with a slight face form to give added side protection, the new goggles are equally suitable for workers wearing non-prescription safety glasses or those using prescription lenses. One type comes in a pink crystal color with white or Calobar 6-curve Super Armorplate lenses. The other type is fitted with side shields and is available in pink crystal with white 6-curve Super Armorplate lenses or in a green color with Calobar 6-curve Super Armorplate lenses.

For more complete information write to the manufacturer and refer to this magazine.

Cleaning Compound For Motor Tune-Up

The formation of carbon is an inevitable result of engine operation, and carbon is an abrasive, causing excessive wear and, on valve seats, reducing compression and increasing power losses. Gummy residue causes valves to stick, prevents the correct expansion of piston rings, clogs carburetor jets, and decreases motor efficiency. In these times, when care of equipment is more vital than ever before, it is extremely important to keep engines clean and free of carbon and other foreign substances.

A recently perfected non-chemical motor tune-up compound to remove carbon, free sticky valves, stop motor ping, and eliminate sticky valves has been announced by the J. W. Speaker Corp., 309 No. Weil St., Milwaukee 12, Wis. The addition of this Fretone, which is a non-chemical hydro-carbon solvent, to the gasoline used in truck or construction-equipment engines purges the valves, piston rings, carburetor jets and other engine parts, and its regular use keeps them clean, the manufacturer states.

Further information on Fretone and its uses may be secured by interested contractors and state and county highway engineers direct from the company by referring to CONTRACTORS AND ENGINEERS MONTHLY.

TORO
POWER MOWERS
All Over the World
TORO MANUFACTURING CORP'N.
MINNEAPOLIS, MINN.
HEADS UP FOR VICTORY!

A Surprising Word--
"AVAILABLE"
YET—WARCO HYDRAULIC CONTROL MOTOR GRADERS ARE AVAILABLE—READY FOR DELIVERY subject to proper WPB-1319 Release, and to the requirements of our Armed Forces.
If you want a modern WARCO postwar model grader, try to qualify for a Release!
Designed by expert engineers; built by fine workmen in a large, up-to-date plant; and successfully used by Army Engineers during the past two years. WARCO Graders, with their simple and accurate Hydromotor Control, do an excellent job of grading, ditching or banksloping with astonishing ease.
Contact us at once or see our distributor in your vicinity. (Name on request)
Remember, although they are now available, "first come—first served"!
WARCO
Built by
W. A. RIDDELL CORPORATION — Bucyrus, Ohio

Repairs Performed In Division Shops

Eight Well-Equipped Shops Do Most Repairs on N. D. Fleet of Maintenance and Snow-Handling Machinery

✦ IN North Dakota it has been found more economical to repair all equipment used by the Maintenance Department of the State Highway Department in strategically located division shops, each well staffed and tooled for many types of work, rather than in a central shop. The divisions at Bismarck and Dickinson have separate buildings conveniently located close together which house the office of the Division Engineer and the division repair shop. At Grand Forks, Valley City (See C. & E. M., May, 1942, pg. 22), Williston and Minot, a two-story building houses both facilities, with the shops on the ground floors and offices above. At Devils Lake the shop occupies a state-owned building while the Division Engineer rents office space in the business district. At Fargo there is only a shop. Widely distributed throughout the state, these eight repair shops prove efficient in keeping the Department's almost 700 separate pieces of major equipment in first-class operating condition.

All repair work, including motor overhauls, is done in the division shops, the only exception being that sometimes in an emergency conveniently located commercial machine shops are called upon to do urgent jobs. Factory-made parts are normally used for replacement but since it is difficult to obtain them under the AA-2 priority granted, worn parts are rebuilt whenever possible.

A Typical Division Shop

The shop in Division No. 1 at Bismarck may be considered typical of all eight shops. The building, constructed in 1939 as a PWA project, replaces the inadequate wooden building where the work was done prior to that time. It is a one-story brick structure, 80 x 120 feet in size. Heavy I-beams support the roof so as to leave the concrete floor unobstructed and available for passage of equipment in any direction or for storage. At the southwest corner is a 30 x 50-foot extension of similar construction which houses washing, greasing, and painting facilities.

The main building has 16-foot electrically operated overhead doors on the south and west sides while the north side is principally of glass, admitting daylight to the work benches ranged along that wall. The wash-rack wing has two 16-foot hand-operated overhead doors opening through the south wall. Inside partitions set off a space 12 x 20 feet near the southwest corner for toilet and showers and in the southeast corner another space 20 x 40 feet houses the parts room and a small office.

The building is comfortably heated by natural-gas-burning unit heaters hung from the ceiling beams so as to be out of the way. Natural gas brought from oil fields in Wyoming and Montana is commercially available in Bismarck and furnishes satisfactory fuel for the shop.

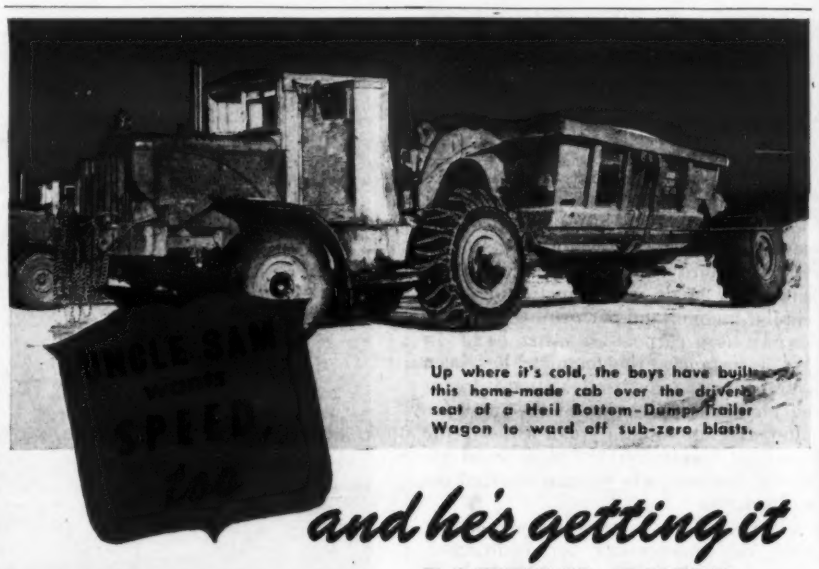
On the same state-owned plot of ground, approximately 580 feet north and south x 440 feet east and west, is the two-story very modern brick building, 52 x 70 feet in size, which houses the state testing laboratory on the first floor and the offices of the Division Engineer on the second. The old wooden shop building, with one end partitioned off for a sign shop, is now used for storage of rolling equipment, and four portable army barracks of World War I days serve to store calcium chloride, grader blades, and similar movable stocks, as well as old machine parts which in normal times might be sold for junk but are now valuable as possible replacements.

The main shop building is ventilated by induced-draft fans discharging through louvre-covered ducts placed on the east and west walls. Foul-air outlets are placed at approximate floor level under the overhead ducts. In addition to this general system, there are several flexible connections for attachment to the exhaust pipe of running motors which conduct dangerous gases to the outside of the building.

A Model W-2208 Wayne compressor driven by a 5-hp Master electric motor furnishes air under pressure to a pipe system by which it is distributed throughout the building for use as a cleaning medium as well as for inflating tires, operating the grease rack hoist and the paint gun. A 75-gallon Pittsburg water heater with an auxiliary insulated storage tank of 300-gallons capacity furnishes ample hot water to be mixed with high-pressure air for cleaning equipment.

The machine shop is in the northeast corner of the main building immediately adjacent to the north-wall work benches, and is served by an elaborate system of overhead tracks with manually operated switches by which the two Louden electric cranes, one of 2-ton and the other of 3-ton capacity, may be used to handle

(*Concluded on page 78*)



Up where it's cold, the boys have built this home-made cab over the driver's seat of a Heil Bottom-Dump Trailer Wagon to ward off sub-zero blasts.

and he's getting it

with **HEIL** BOTTOM-DUMP TRAILER WAGONS

Before the war, many dirt-moving firms were breaking speed records with this Heil unit. Today, the men of the armed services, too, are doing the unbelievable in moving a lot of dirt, in record time. Dumping is under fingertip control . . . all in one heap, or with an even spread. Doors are power-opened — in 2 seconds — under cable control (they close by gravity). You get a 35 inch clearance with the doors wide open — no dragging — nothing to slow up the unit. The operator turns off the windrow at sharp angles whenever he chooses. Place your order now for early post-war delivery.

R-32

THE HEIL CO.

ANTHONY LIFT GATE HYDRAULIC

CAPACITIES 1000 LBS. TO 1500 LBS.

"A LABOR SAVER"
"TAKES PLACE OF EXTRA MAN"
"HAS MORE THAN PAID FOR ITSELF"
"DAMAGE CLAIMS PRACTICALLY NIL"

MOUNTS ON TRUCKS NOW IN SERVICE OR ON NEW TRUCKS

ONE MAN now does the work of THREE

- "We can recommend this Loader to anyone, as they certainly are not only a labor saver, but they also protect the steel drums which are very hard to secure. We are ordering another."—The R. J. Brown Co., St. Louis, Mo.
- "The Lift Gate has definitely taken the place of an extra man; if we could not buy another we would not part with our present one for many times what we paid for it."—Continental Oil Co., Louisville, Ky.
- "Our merchandise damage claims have been practically nil."—M. F. Rockey, Moving, Storage, Packing & Shipping, New Cumberland, Pa.
- "Best possible testimonial—ordering two more next week."—Springfield, Ill.
- "This equipment has more than paid for itself since purchased, and we recommend the installation of such equipment on all trucks where loads of 150 lbs. or over are handled."—Bakelite Corporation, Bloomfield, N. Y.

A PARTIAL LIST OF OTHER USERS

Socony Vacuum, Coca Cola, Standard Oil, E. I. DuPont deNemours, and a list of other users, like the Union Pacific Railroad, are enthusiastic operators of the Lift Gate Loader.

3 men required to load truck.

1 man slides heavy cooler onto lowered LIFT GATE.

1 man operates lever to raise 3 heavy oil drums.

1 man easily loads barrels from raised LIFT GATE.

ANTHONY'S ZB PLATFORM HOIST—Makes Inexpensive dump body out of platform, stake or grain body.

ANTHONY COMPANY, INC.
STREATOR, ILLINOIS

The low price will surprise you. Write or wire for complete information—address Dept. D-21.

Highway Maintenance Needs Studied by PRA

In order to cooperate more effectively with the War Production Board in securing allocations of available equipment to the maintenance of the most important highway routes and to furnish data for future equipment and replacement-parts production schedules, Public Roads Administration engineers, working with the maintenance engineers of the state highway departments, are preparing reports on highway-maintenance and material needs in relation to the importance of the routes to be maintained. Copies of the endorsed reports will be submitted to the War Production Board for reference with respect to allocations from quotas already established for 1944 and in determining 1945 production quotas, and the reports will also be used to inform agencies charged with the distribution of Federal surplus equipment and materials of highway maintenance needs.

In preparing these reports, routes are being ranked in importance according to the following schedule:

1. Routes of primary interest to the war effort, including roads designated by the Army Service Commands, and more important roads to mines and war production areas, both on and off the state highway systems.

2. Routes on the state highway systems and extensions through municipalities serving heavy and medium volumes of traffic.

3. Routes on the state highway systems serving communities entirely dependent on highways for transportation.

4. Routes on the state highway systems serving light traffic, and secondary Federal-Aid routes off the state highway systems (farm-to-market roads, etc.)

Emergency needs for repairs caused by storms, snow, ice, etc., which are dangerous traffic hazards, are to be ranked as of highest importance on all these classes of routes. Thereafter, in states having limited maintenance resources, the performance of repairs or maintenance operations on the above routes shall be considered according to the following order of importance to be attributed to each highway element: (a) surface; (b) drainage; (c) shoulders; (d) minor structures; (e) major structures; (f) traffic service; (g) roadside.

New Manual for Users Of Two-Way Dump Trailers

A very comprehensive 112-page Operating and Maintenance Manual, designed to enable users to get maximum performance from Athey two-way dump trailers, Models DB-32, EB-32 and FB-32, is now available for distribution. Following the general plan of previous manuals on other types of equipment, the book is divided into two parts, the first part being devoted to operating procedures, lubrication and inspection, with a description of the construction and uses of the equipment, and the second covering maintenance, including the field servicing and shop reconditioning of Forged-Trak wheels, body, hydraulic pump, hydraulic hoist and drawbar assembly, and the best methods for detecting and remedying failure or imperfect performance of any part. Numerous illustrations and diagrams are included, to help in understanding and following the text.

Users of Athey two-way dump trailers may secure copies of Manual No. 1 by writing direct to Athey Trust Wheel Co., 5631 W. 65 St., Chicago 38, Ill.

WATER BOY
1944 Model

20 FEET OR HUNDREDS OF MILES . . . YOU CAN DEPEND ON NAYLOR LIGHT-WEIGHT PIPE TO DELIVER

Whether your job calls for water or de-watering . . . high pressure or low . . . it will pay you to check the advantages of Naylor Light-weight Pipe.

This pipe with the exclusive Lockseam Spiralweld structure provides dependable performance not found in any other light-weight pipe. Greater strength that enables Naylor to handle jobs normally requiring heavier-wall pipe. Leaktightness. Safety—through its "continuous expansion joint" construction that absorbs shock loads, stresses and strains.

Along with these benefits, Naylor gives you greater speed of assembly, cuts work, lowers maintenance and effects other economies right down the line.

Sizes from 4" to 30" in diameter—thickness from 14 to 8 gauge. All types of fittings, connections and fabrication.

Use NAYLOR PIPE for

Dredging • Hydraulic Sluicing • De-Watering • Ventilating • Exhaust and Intake • Gas Gathering • Pulp Lines • Vacuum Lines and other high or low pressure lines.

Naylor
LOCKSEAM
SPIRALWELD PIPE

NAYLOR PIPE COMPANY
1270 EAST 92nd STREET, CHICAGO 19, ILL.
NEW YORK OFFICE
350 MADISON AVENUE, NEW YORK 17, N. Y.

"Pals" of G. I. Joe *right now* . . .

HEIL
Cable Dozers

are demonstrating their ability to "take it" on the fighting fronts of the world . . .

When peace returns,

SEE YOUR INTERNATIONAL TRACTRACTOR DEALER

ARMY E NAVY

THE HEIL CO.

Do Your Part—Keep On Buying Bonds
DON'T SKIMP.

One Traffic-Stripe Unit For All Georgia Roads

(*Continued from page* 18)

type pump is used for transferring the paint from the drums on the hauling truck to the tank on the striper.

The crew required to man the striper consists of the driver for the striper itself, a paint control man at the rear, and the foreman. On the auxiliary truck, there is a driver and the man who drops the blocks on the newly painted stripes to prevent traffic damaging them. Two flagmen direct traffic.

When painting black stripes, tar center-line paint is used. With this, it is necessary to sand the stripe in addition to protecting it with the blocks. The sanding is done with dry sand, hand-cast from the paint-hauling truck which at these times carries a smaller number of drums of paint and the dry sand at the back of the truck body. One man in the truck pushes the sand back to a man sitting at the tail-gate who spreads the sand by hand over the stripe. When black stripe is being painted, the man placing blocks spots them on either side of the stripe instead of on the stripe. This makes it possible for the sand man to distribute this blotter uniformly the entire length of the stripe.

When operating on rough pavement, the striper runs at from 6 to 8 miles per hour and while working on concrete or sand-asphalt or hot-mix top, it operates at 12 miles per hour. This makes it possible to stripe between 35 and 40 miles in ten hours, although as much as 60 miles has been done in that length of time. Considerable time is lost when it is necessary to change from black to white paint as these are applied through the same spray nozzle and it is necessary to clean the lines with solvent.

Personnel

Formerly three of these machines were used throughout the state but, because of a shortage of men, only one is now operated, under the direction of M. L. Shadburn, Maintenance Engineer, by E. B. Blount, Superintendent of center-stripe painting for the state. J. T. Stasser is Foreman of the painting unit.

Post-War Public Works For Economic Stability

The place of a balanced public works program in post-war plans for economic stability was stressed by Harold D. Smith, Director, Federal Bureau of the Budget, in an address before the Forty-First Annual Meeting of the ARBA, which has been made available in booklet form by the American Road Builders' Association, 1319 F Street, N.W., Washington 4, D. C.

In discussing the need for employment-giving projects to counterbalance the inevitable dislocations caused by post-war reconversion, Mr. Smith pointed out that these projects should be of permanent as well as immediate value. "In recent years", he said, "because of the emphasis placed upon immediate contributions to employment and purchasing power, we have frequently lost sight of the simple fact that we should build public works primarily because we need the public services such works will provide after completion . . . we should build highways, for example, because we need these facilities for public transportation purposes."

HOW AIRFIELDS GROW
ON MUCK, ON SAND, ON TUNDRA

ON world-wide battle fronts America's planes are taking off on missions against the enemy—taking off from desert sand, jungle muck, or Aleutian tundra.

In a matter of days, bulldozers shove aside the muck or level the sand. And giant cranes lay steel landing mats that are bolted into a landing strip.

Look at the engines in these bulldozers and cranes. You'll find familiar friends—the same friends that power tanks and trucks, landing barges and patrol vessels, tractors and auxiliaries—General Motors Diesels.

And in these rigorous jobs of war, a promise is being written—a promise of plentiful, dependable, easily maintained, low-cost power for America's needs in the peacetime days ahead.

Tomorrow

Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

GM GENERAL MOTORS DIESEL POWER

ENGINES...15 to 250 H.P.... DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.
ENGINES...150 to 2000 H.P.....CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio
LOCOMOTIVES.....ELECTRO-MOTIVE DIVISION, La Grange, Ill.

JOHNSON'S BULK CEMENT PLANTS
To Meet Every Need of the
PAVING CONTRACTOR

CEMENT BATCHERS

Manual automatic and semi-automatic weighing types. All-welded hoppers designed to assure free flow of materials and prevent arching of cement. Discharge valve provides positive, leak-proof operation. Overhead adapter scale frame protects operating part of the scale from dirt and accident . . . contributes to convenient operation.

ELEVATING CHARGER

Combines advantages of adaptability, portability and Can be towed behind a batch truck. Crew of two or three men can block it into position and have it weighing 34 E paver batches at the rate of 90 per hour in 1½ hours . . . without a crane. Quickly converted to a transfer plant or for charging truck mixers.

DUTCH MILL

Designed for economical handling of bulk cement on paving jobs. All cement handled mechanically by one man. Equipped to unload cement from either hopper or box cars. Erection and dismantling are quick and easy. 50, 100 and 150 barrels capacity.

PORTABLE SECTION BINS

For contractors who need greater storage capacity than is provided by Elevating Charger or Dutch Mill. Completely portable. Capacity may be increased in the field. Equipped for unloading and batching cement delivered in any type of transportation facilities. 240 bbl., 375 bbl. and 500 bbl. capacities. Elevator Equipment with capacities up to 300 bbls. per hour.

The C. S. Johnson Company
Champaign, Illinois

Back the INVASION!
Buy War Bonds

Folders on Ice Control With Calcium Chloride

The efficacy of calcium chloride in melting or skidproofing icy surfaces by direct application or mixed with abrasives is discussed in two small folders now available for distribution. A series of illustrations shows how and when it can best be used to protect danger spots in icy weather, and figures are given to demonstrate that the treatment of abrasives with calcium chloride, either for immediate spreading or for stockpiling, means a saving in man-power, equipment, time and money.

Highway engineers or others who must cope with the problem of ice control may secure copies of these folders from the Wyandotte Chemicals Corp., Michigan Alkali and J. B. Ford Divisions, Wyandotte, Mich.

Catalog on Hydraulic Torque Converters

A 16-page booklet giving facts on the function, operation and installation of hydraulic torque converters, with explanatory diagrams and photographs, has been issued by the Twin Disc Clutch Co., of Racine, Wis., and Rockford, Ill. The purpose of the booklet is to help machine designers, manufacturers and users to understand more clearly the possibilities and capabilities of this method of gaining mechanical advantage between driving and driven units, and to point out to them the various factors to be taken into account when the use of these power links is being considered. Following a discussion of the use for and operation of the hydraulic torque converter, there is a detailed description of several Twin Disc models, together with installation data and specifications.

Copies of Bulletin No. 135-A may be secured by writing on your official letterhead to Twin Disc Clutch Co., Hydraulic Division, Rockford, Ill.

New President Elected By Union Carbide & Carbon

Announcement has been made of the election of Fred H. Haggerson as President of the Union Carbide & Carbon Corp., New York City. Mr. Haggerson, who succeeds Benjamin O'Shea as President, formerly occupied the post of Vice President and Director and has been associated with the company for twenty-five years. Mr. O'Shea now becomes Chairman of the Board.

A pair of 34-E Multi Foote Pavers working in tandem speed up completion of airport runways in America.

Somewhere in England a pair of 34-E Multi Foote Pavers pave 210 feet of 25-ft. runway 8-in. thick every hour.

Breaking Paving Records

Is a Habit of Ours at Home and Abroad

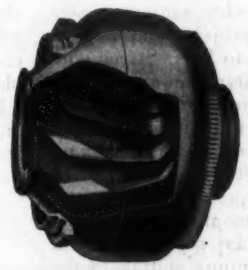
Paving airport runways and roads at record-breaking speed is an every day job for Multi Foote Pavers. They set more records than any other make, not only because there are more of them in service but because all these features mean better mixing and faster charging and discharging:

DOUBLE CONE DRUM with its end-to-end scouring action insures a complete and thorough mix of every batch.
TROUBLE-FREE WATER SYSTEM is simple, accurate and independent of water pressure.
HIGH OPERATING PLATFORM assures greater visibility and faster, more accurate work.
ROTARY DISCHARGE takes only a quarter turn to kick concrete into the big bucket ready to speed out the long boom to be discharged.
BIG, WIDE, SOLID SKIP prevents spilling and assures fast, positive charging.
SIMPLE, RUGGED DRIVE provides fast, smooth action.

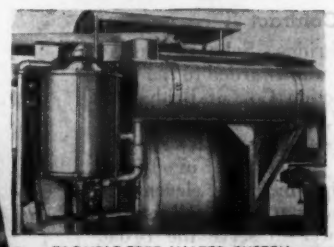
Multi Foote Pavers are leading the field all over the world. Machines that can win the battle of putting down runways and roads in war theatres everywhere are a sure thing to make money for you on peacetime road contracts. Write direct or ask your Foote dealer for all the details.

THE FOOTE COMPANY, INCORPORATED, Nunda, New York

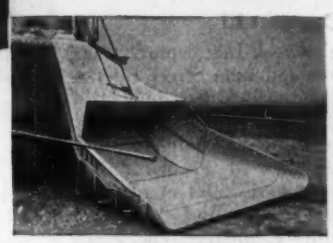
The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers. ★ *Multi Foote Pavers Conform to A. G. C. Standards and Specifications.*



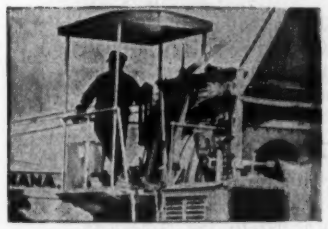
DOUBLE CONE DRUM



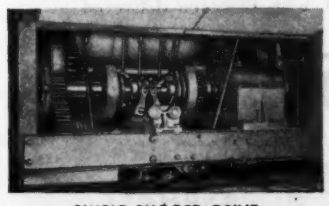
TROUBLE-FREE WATER SYSTEM



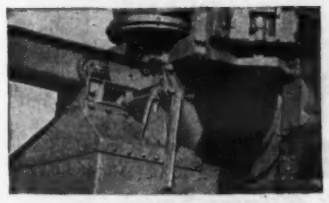
BIG WIDE SOLID SKIP



HIGH OPERATING PLATFORM



SIMPLE RUGGED DRIVE



ROTARY DISCHARGE

MULTI FOOTE
CONCRETE PAVERS

ARMY E NAVY

ADNUN BLACK TOP PAVER

Contracts for Sewer Project in Bridgeport

(*Continued from page* 21)

Contract I

This contract for the Evers Street Pumping Station and Sanitary Sewer was awarded to Pascone Bros., Inc., of Bridgeport, Conn., for $32,498.50 and is now complete. The small pumping station is located near the intersection of Evers Street and Huntington Turnpike in the northeast section of Bridgeport, to serve a 250-unit defense housing project. The contract included pumping equipment and appurtenances, 350 feet of 15-inch vitrified-clay sanitary sewer from the housing projects and beyond the pumping station to Evers Street, connecting with a sanitary sewer installed by PWA, and 420 feet of 12-inch vitrified-clay pipe from the pumping station to and on Evers Street to the first manhole, continuing with 1,000 feet of 8-inch vitrified-clay pipe. There was a total of fourteen manholes and also 140 feet of 10-inch vitrified-clay pipe for a storm sewer from the pumping station to the storm sewer in Evers Street.

Contract II

The Broadbridge School Sanitary Sewer contract was awarded to the Clark Sewer Construction Co., of Bridgeport, Conn., for $47,918.50 and is now completed. It consists of a sanitary sewer of approximately 1,700 feet of 15-inch vitrified-clay pipe, including eleven manholes, and connects at Nutmeg Road with an existing sewer to serve the Broadbridge School District.

Contract III

The Johnson's Creek Interceptor, also referred to as the Jefferson Street Interceptor, contract was awarded to F. B. O'Neill & Co., of Hartford, Conn., for $64,902. This contract is complete and consisted of 200 feet of 54-inch reinforced-concrete pipe, 1,760 feet of 36-inch reinforced-concrete pipe, 415 feet of 33-inch reinforced-concrete pipe, 300 feet of 60-inch reinforced-concrete pipe, ten manholes, three special chambers, the resetting of 800 feet of curb, and the repaving of 540 square yards of asphalt pavement. Moretrench wellpoints were used to keep the trench dry in the outfall section of this sewer.

Contract IV

This contract for furnishing all of the reinforced-concrete pipe required for the project was awarded to the American Concrete Pipe Co., of Flushing, N. Y., for $77,129.80, with the pipe delivered f.o.b. Bridgeport to designated storage yards where it was picked up by the contractors who held the excavation and laying contracts. The quantities of the various sizes of pipe were as follows:

24-inch	438 feet
27-inch	1,541 feet
30-inch	3,130 feet
33-inch	2,794 feet
36-inch	2,815 feet
42-inch	310 feet
48-inch	219 feet
54-inch (standard)	200 feet
54-inch (extra heavy reinf.)	5,100 feet
60-inch	280 feet

Contract V

This contract was for the installation of 24-inch cast-iron pipe in a double inverted siphon 240 feet long connecting the Johnson's Creek Interceptor with the Jefferson Street trunk sewer and thence to the new East Side Disposal Plant which is yet to be built. The upstream siphon chamber has an overflow weir which discharges storm water to the creek. The contract, which is now complete, was awarded to Spearin, Preston & Burrows of New York City for $37,725, and will be described in detail in a subsequent article.

Excavation on Contract VI of the Bridgeport sewer project, awarded to Cecio Bros. of Greenwich, Conn.

Contract VI

This contract for a trunk sewer in Seaview Avenue from Stratford Avenue to Deacon Street, and in Connecticut Avenue north and south from Seaview Avenue, was awarded to Cecio Bros., of Greenwich, Conn., for $67,653. It consists of 220 feet of 48-inch reinforced-concrete pipe, 2,400 feet of 30-inch rein-

(*Continued on next page*)

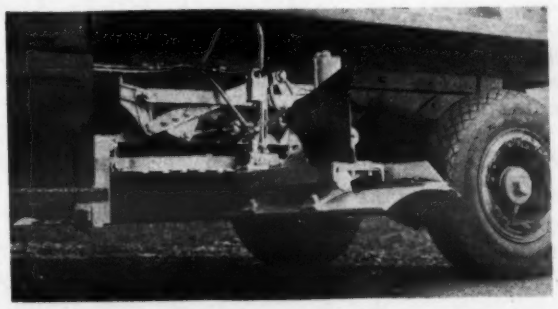
"HUNDREDS IN USE BY THE U. S. AND ALLIED ARMIES AT HOME AND ABROAD, MAINTAINING AIRPORTS, APPROACH STRIPS, ROADS, STREETS, ETC., ALL YEAR 'ROUND."

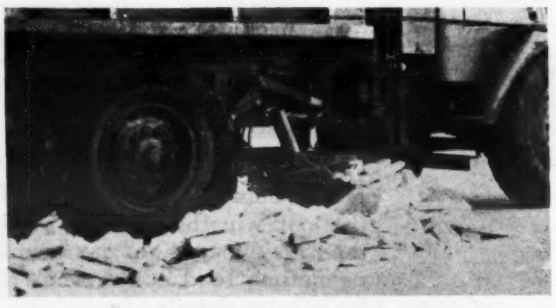
Safety First . . Remove Ice Hazards

THE NEW WILLETT HYDRAULIC TRUCK-GRADER

Cuts, breaks up ruts and ice off streets and roads quickest, cheapest way with rotatable curved moldboard, cushioned or rigid operation, blade pitched forward for ice cutting when desired; **—all with full hydraulic power control of tilting, rotating, and reversing of curved moldboard from the truck cab.**

IT CUTS! **IT GRADES!** **IT MAINTAINS!**





The above new "Willetts" on state highway trucks are doing a splendid job cutting and breaking up ice and general all year around maintenance. Many city and county highway departments are using "Willetts" with great success! Models for all makes of trucks, 1½ tons and up; standard lengths up to 14'; moldboards up to 17" wide; 10" to 15" clearance under lifted blade.

WRITE FOR LITERATURE, PRICES, ETC. ON NEW MODELS. PATENTED AND PATENTS APPLIED FOR.

Designed and built by •

WILLETT MANUFACTURING COMPANY
GRAND RAPIDS 8, MICHIGAN

Canadian Manufacturer

CUSSON BROTHERS, LTD.
MONTREAL, CANADA

Will It Work? . . . . . It Will If It's a Willett

MODERNIZE

YOUR ASPHALT PLANT by installing *The* **FLUIDOMETER**

Automatic Metering System

With a Fluidometer System, a push button replaces the weighing bucket routine. When the button is pushed the Fluidometer delivers the predetermined quantity, then automatically resets for the next delivery. Or it may be operated automatically by the mixer time lock. Paving mixtures are held to precise limits of uniformity—time and operating costs saved. Adaptable to all types of plants. Write for descriptive literature.

HETHERINGTON & BERNER INC.
731 Kentucky Ave. • Indianapolis 7, Indiana

Conn. Industrial City Enlarges Sewer System

(*Continued from preceding page*)

forced-concrete pipe, 1,140 feet of 27-inch reinforced-concrete pipe, 850 feet of pipe of smaller sizes, twenty-three manholes, four special manholes 14 feet deep, and also the resetting of 900 feet of curb and the repaving of 2,700 square yards of asphalt pavement, and the tunneling and bracing under seven spur railroad tracks. This sewer takes care of industrial sections and 1,450 units of defense housing in the Success Park Project.

Contract VII

This contract for a sewer in Waterview and Stratford Avenues, to take care of the great industrial expansion plus 1,286 units of Federal housing in Yellow Mill Village, which was built as a slum-clearance project but is now open to war workers, was also awarded to Cecio Bros., of Greenwich, Conn., for $92,090. It consists of 2,150 feet of 33-inch reinforced-concrete pipe, 150 feet of 36-inch reinforced-concrete pipe, thirty-one manholes five of which are equipped with tidegates and diversion weirs, and includes 650 feet of 21-inch reinforced-concrete and 550 feet of vitrified-clay pipe. There are also two special manholes 50 feet deep of reinforced concrete. Also included are the resetting of the 300 feet of curb and the repaving of 2,800 square yards of asphalt pavement.

Contract VIII

This contract is for a double siphon of 30-inch cast-iron pipe under Yellow Mill Pond, 880 feet long, two special manholes of reinforced concrete 23 feet deep and 100 feet of 36-inch reinforced-concrete pipe. The contract was awarded to Spearin, Preston & Burrows of New York City for $82,860. The total pipe required is 1,760 feet of 30-inch cast-iron pipe across Yellow Mill Pond which will connect the Waterview Avenue trunk sewer to the Stratford and Seaview Avenue trunk sewers. A description of this work will be contained in a later article in this series.

Contracts IX and X

Contract IX is Section 1 of the Water Street and Railroad Avenue Trunk Sewer from Congress Street to Broad Street, which is being constructed to pick up all the sewage going through the Congress Street screening plant, which at the present time removes approximately 5 per cent of the solids of the sewage which flows through it daily. This trunk sewer will eliminate the seven raw-sewage outlets now emptying into the Pequonnock River from Congress Street south. These raw-sewage outlets serve 500 acres comprising the entire business and shopping center of Bridgeport. Section 1 of the Water Street trunk sewer was awarded to V. Barletta Co., of Roslindale, Mass., for $212,375.00, and will be described in an article in our next issue. The quantities included in this contract are as follows:

54-inch reinforced-concrete pipe	2,600 feet
48-inch reinforced-concrete pipe	210 feet
42-inch reinforced-concrete pipe	200 feet
36-inch reinforced-concrete pipe	800 feet
30-inch reinforced-concrete pipe	440 feet
27-inch reinforced-concrete pipe	400 feet
18-inch vitrified-clay pipe	360 feet
15-inch vitrified-clay pipe	360 feet
12-inch vitrified-clay pipe	330 feet
10-inch vitrified-clay pipe	40 feet
8-inch vitrified-clay pipe	400 feet
Manholes	24
Plain concrete for cradles	750 cu. yds.
Wood sheeting left in place	250,000 BM

Section 2 of the Water Street trunk sewer has not as yet been awarded and is estimated to cost $228,724. This contract runs through Water Street from Congress Street south to Union Square, connecting there with Section 1. It includes 54-inch down to 27-inch reinforced-concrete pipe and 18-inch to 8-inch vitrified-clay pipe, as well as thirty-nine manholes, nine of which are equipped with diversion weirs and tidegates, and also work on the east side of the Pequonnock River to eliminate two raw-sewage outlets.

Contracts XI and XII

Contract XI is for chlorination equipment estimated to cost $25,000. The chlorine-control equipment will be installed in two temporary chlorination stations, one on Bostwick Avenue at Spruce Street, and the other on Seaview Avenue at its junction with Jefferson Street.

Contract XII is for miscellaneous iron and was awarded to Hunter & Havens of Bridgeport, Conn., for $410.06. It covers 1,000 pieces of 1-inch diameter steel for manhole steps.

(*Concluded on page 77*)

Every time you run a length of non-preformed rope over a small sheave or drum, you create a high degree of bending fatigue that shortens the life of the rope.

In contrast, when you use Bethlehem Form-Set in your clamshells, derricks, cranes, and power shovels, you've got rope that's "relaxed" because it's been made by the preforming process. Form-Set Rope is flexible . . . unusually free from built-in torsional stresses.

Where it is necessary that sheave and drum ratios be small, these characteristics are especially desirable, for they mean smoother spooling, longer rope-life, smaller maintenance costs, and a lot less trouble-shooting.

Besides the Form-Set feature, you'll want Bethlehem's Purple Strand grade of rope for lifting and earth-moving work. Purple Strand is Bethlehem's top quality —made of improved plow steel—and that means it's as fine a rope as you can buy anywhere.

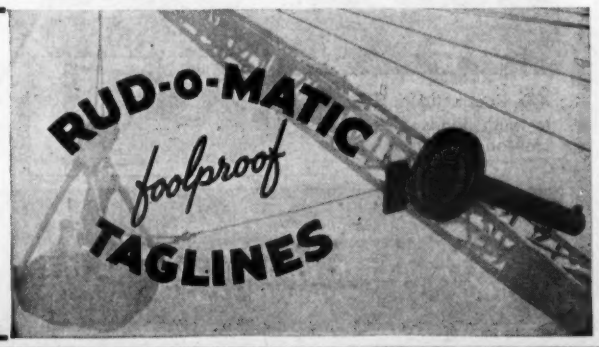
When you think WIRE ROPE

. . . think BETHLEHEM

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearings and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles 11



Our faith in things democratic must burn as white hot as that of our enemies in their philosophies.

—HALIFAX

The recrystallization of rock salt on a road surface locks in fine soil and gravel particles to give greater resistance to abrasion.

Stabilization Improves N. Y. Township Roads

(*Continued from page* 41)

of our roads, in first-class condition today, has received only two treatments of salt in the past six years. It is necessary only to blade the roads once a year early in the spring."

Driving through the county, it is not difficult to distinguish between the treated roads of Elbridge Township and the untreated systems under other jurisdiction. Loose surface materials are less common on the treated stretches and a smooth hard roadbed, which makes possible reasonable travel speeds without noisy car vibrations, is characteristic of the salted roads. Little dust is raised by a vehicle even at 35 miles an hour, and curves and intersections, where the thrust of tires causes greatest abrasion to road surfaces, are noticeably firm and level. Many of the Elbridge roads serve as connecting links between important highways and carry a greater than average load of traffic and heavy farm equipment.

Discussing a road which had just received salt treatment, Mr. Jordan explained, "We completed this 1½-mile section with our regular crew of six men in only three days' time. After the road is dry, the surface sets up hard in a very short time, sometimes within half an hour."

Outlining the procedure followed, Mr. Jordan reported that first the road is bladed to move all loose surface materials to the side. Scarifying is often not necessary. When all depressions have been filled, a spreader attached to a truck moving down the center of the road distributes the rock salt uniformly. Fine gravel is then spread over the surface and a sprinkler thoroughly wets the materials. A roller then compacts the salt and gravel. The fine white salt particles recrystallize in the top layer when the road is dry, leaving a surface so hard that it resists the entrance of a knife blade, it is reported.

One part of salt to four parts of gravel is used for patching stretches which have been exposed to severe wear, when it is not necessary to retreat the entire road. After the mixture has been wet down and rolled, it sets up like the original treated road surface and it is reported that it is difficult to see where the repairs were made.

Last summer McDonald Road in Elbridge Township was widened in places and given salt treatment for its entire 2-mile length. In spite of an unusually wet spring and subsequent extremely dry weather, the wearing course appears in prime condition.

Mr. Jordan said, "Of course, rock salt can't work wonders with poor materials, and unless the road is properly built, you can't expect much. But, with good gravel and binder, an application of about 2 pounds of salt per square yard for the first treatment and careful following of the approved methods of road construction will give the best economical long-wearing surface I know of, and the people who use it will be well satisfied."

Camillus Township Work

In the neighboring township of Camillus, Charles Peterson, Superintendent of Highways, has been an advocate of the use of rock salt in soil stabilization of roads for six years. During 1943, 30 tons of Grade CC rock salt were used in maintaining the roads of the township, and Mr. Peterson estimates 40 tons will be required this year.

"Rock salt is a definite labor saver and cuts maintenance costs for us," Mr. Peterson reported. "Because of the war, with the shortage of men, a large part of our work last summer was repairing pot-holes. I have found that a mixture of 15 to 20 per cent rock salt with fine gravel makes splendid patching material. The mended spot comes up hard and compact; in fact, the salt makes it so hard that if a half-and-half mixture is used, the pot-hole patch becomes a bump as the road surface around it wears down.

"Because it provides such a hard surface, the salt in our roads is a considerable help in keeping down the dust to which people object. Some of the roads haven't been salted for several years, but they are good and firm and don't blow away in dry weather.

"Considerable salt is used all year round. We're doing more and more snow removal and ice control work each year. There are 86 miles of road which we have to keep open in winter, and we use salt mixed with stockpiles of cinders to keep them from freezing in cold weather."

Several miles of streets in the unincorporated village of Fairmount, a residential area with a population of 1,800,

(*Concluded on next page*)

MONDIE DROP and UPSET FORGINGS
FOR CONSTRUCTION EQUIPMENT
Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.
Inquiries given prompt attention by our Engineering Dept.
MONDIE FORGE COMPANY INC.
10299 Berea Road Cleveland 2, Ohio

2A 4-wheel hydraulically operated Scrapers for earth moving, specifically constructed for fast digging, easy loading, accurate spreading.

2B 4-wheel cable operated Scrapers for earth moving provide less power to load; greater clearance; flexibility for fast hauls; positive rolling ejection; precision spreading.

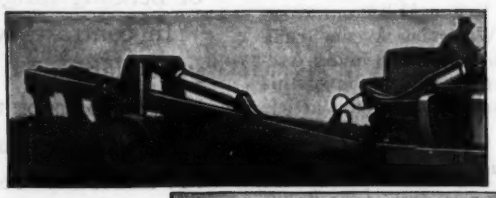
GW

GAR WOOD Road Machinery

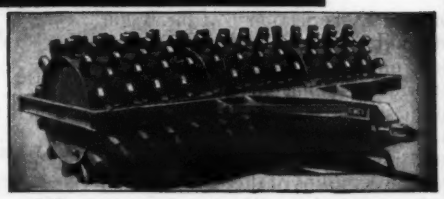
Gar Wood Industries, Inc., manufactures a complete line of heavy-duty, earth-moving machinery: two-wheel Hydraulic Scrapers in 3, 5, 6, and 8 cubic-yard capacities; four-wheel Hydraulic Scrapers in 8, 10, and 15 cubic-yard capacities; four-wheel Cable Scrapers in 11, 15, 20, and 25 cubic-yard capacities; Bulldozers; Roadbuilders; Tamping Rollers; Rippers. Accepted by leading contractors and governmental agencies throughout the world, as meeting all requirements for heavy earth-moving equipment.

Refer to picture number when ordering literature

2C 2-wheel hydraulic Scrapers for low-cost, earth moving—dig, load, haul, back dump, make short turns.

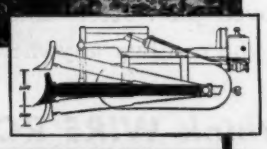


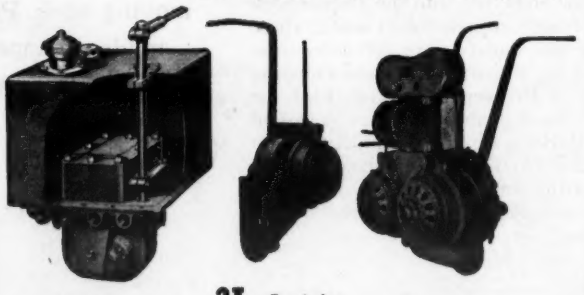
2F Rippers rip compacted earth, shale, rock, roots, old pavements, old roads.



2G Sheep-foot Tamping Rollers built with interchangeable drums (single, double, triple).

2D Bulldozer: Blade fixed for pushing loads ahead.



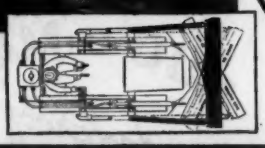


2H Hydraulic Control Unit

2J Cable Control Single Drum.

2K Cable Control Double Drum

2E Roadbuilders: Blade set to push loads ahead, sidecast loads to left or right.



Hydraulic and Cable Control Units for operation of Scrapers, Bulldozers, Roadbuilders, Rippers, for heavy-duty service with track-type tractors.

GW ROAD MACHINERY is Sold Through ALLIS-CHALMERS Dealers Everywhere

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

Recipe For Low-Cost Rock-Salt Treatment

(*Continued from preceding page*)

are maintained by the Camillus Township Highway Department. The soil roads, flanked with rows of shade trees, have been successfully treated with salt and have stood up well under the heavy traffic of delivery trucks, and private cars in which the residents travel to work. Even on the grades there is little evidence of wear and a noticeable absence of dust, a common cause for complaint in untreated roads.

"Salt-stabilized roads make a good foundation for a bituminous top," Mr. Peterson added. "When increased traffic warrants it, we put down a black-top surface over the salt road, and the firm base keeps the pavement in good shape for a long time."

Recipe for Salted Roads

Since the wearing qualities of any road are proportionate to the quality of materials used and the care taken in its construction, it is important that the use of rock salt for road stabilization be in accordance with recommended procedure. Mr. Ettinger of the International Salt Co. suggests the following:

After suitable aggregates and binder have been worked together and graded to the desired level, 2 pounds of Grade CC rock salt per square yard is distributed with a regular chloride or lime spreader or spinner-type spreader. A final grading or harrowing works the salt into the loose material at least ½ inch. Compaction by a roller follows, after the materials have been dampened either by rain or sprinkler. Salt-stabilized roads should have a crown of ½ to ¾ inch per foot of width to insure run-off. Ordinary roads already constructed may be improved by working the salt into the surface coating and following the procedure outlined.

The application of a pound of rock salt per square yard each spring over previously built salt roads is recommended. If the surface is in good shape, it is not necessary to work the salt in by scarifying; it may simply be spread just preceding or during a light rain where no sprinkler is available. With no treatment other than this annual salting and a light blading, roads have stood up well for six years before an additional layer of surface materials was required. Rock salt has also been used with success for eliminating soft shoulders along concrete and bituminous highways.

Rock salt performs no alchemy. It cannot render a smooth wear-resistant surface indefinitely if inferior materials are used in the sub-base and surface, or if approved construction methods are not followed. However, where there is a well-proportioned mixture of the aggregates in fines and coarser particles, and a suitable binder such as clay, loam or limestone dust, the salt acts upon the binder to make the road more compact The surface, therefore, will be less muddy during wet weather than an untreated road and during dry periods the salt, by creating a density and hardness of the wearing course, prevents the surface from blowing away in the form of powder.

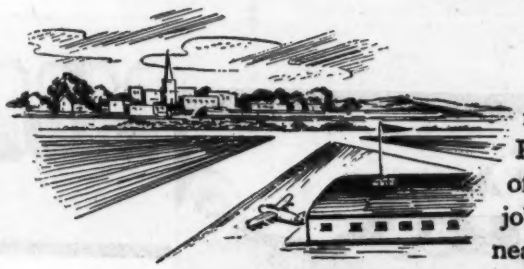
Salt roads laid in widely scattered sections of the country have demonstrated the stabilizing ability of salt used in combination with a variety of local road construction materials. In New York State more than 800 miles of salt roads have been laid down, and in twelve other states highway superintendents report that the use of rock salt in the economical construction and maintenance of soil roads has proved satisfactory.

"S" Award for Safety

The Caterpillar Tractor Co., Peoria, Ill., recently received the National Safety Council's "S" Award for its excellent safety record in 1943. This company has consistently reduced lost-time accidents during the past several years.

when Corntassel Corners builds an Airport...

...will you DO THE PAVING?



You can get the contract if you have the equipment for doing a better job for less money in a shorter time. Buckeye R-B Power Finegraders for preparing subgrade offer you big advantages on any paving job. They save labor by doing away with nearly all hand labor on the grade. By keeping the prepared grade always well ahead of the pavers they eliminate expensive delays. Less material is required because accurate subgrade reduces loss of yield to a negligible percentage. All types of soil, including sticky gumbo and rock-laden materials are readily handled. Write for full details today. Get ready for tomorrow's big paving jobs now!

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

RB POWER FINEGRADER

Buckeye

Tractor Equipment
Road Wideners
Power Finegraders
Trenchers
Convertible Shovels
Spreaders

keep your eye on Buckeye

MARTIN TRAILER

—4 models—
7, 10, 15 & 20-ton capacities

Don't say, "We want a TRAILER." Say: "We want a MARTIN Trailer."—This will insure your getting a trailer that's EASY LOADING, POWERFUL, FAST, SAFE, LONG-WEARING and ECONOMICAL. . . . .
Sold by all Caterpillar Distributors.
WRITE FOR BOOKLET

Martin Machine Company, Kewanee, Ill.

FEATHER the nests of our multiplying warbirds—or there will be no nests left to any of us. Buy Bonds. CONSERVE, stimulate, protect—all in one—buying Bonds.

An International TD-9 diesel Trac-TracTor with ½-yard front-end loader at the plant of the Beyer Crushed Rock Co. of Kansas City, Mo. Four such TD-9's equipped with loaders are being used, not only in the open as shown for loading rock that goes to two big crushing plants but also for underground loading, limestone rock being thus produced from several tunnels or mines ¼ mile in length. The rock is crushed in sizes for various building and construction purposes and also as agricultural limestone.

New Pictorial Brochure On Cedarapids Products

An attractive and well-illustrated brochure has been prepared by the Iowa Mfg. Co., Cedar Rapids, Iowa, manufacturer of Cedarapids crushing and screening plants, asphalt plants and material-handling equipment, which depicts the part the company is playing in serving the present-day requirements of our armed forces, lend-lease and industry, and in planning for the highways and airways of tomorrow to which the book is dedicated. Excellent photographs are included, showing the foundry, engineering, production and executive departments and personnel, as well as Cedarapids installations in various parts of the country for both military and civilian use, while the text tells the story of the development of the company and its products.

Contractors and highway engineers may secure copies of this brochure by writing to the company on their official letterhead.

GEERPRES
TANGLEPROOF MOP STICK

No screws or clamps to tangle mops or injure furniture

AVAILABLE ON PRIORITY BASIS

Will accommodate any size mop from a 16-oz. to a 36-oz. inclusive. Automatic, self-adjusting spring tension securely holds mop in place.

Write for further information concerning GEERPRES Mopping Equipment

GEERPRES WRINGER Inc. MUSKEGON 51 MICHIGAN

★ EXTRA ★
Long Life
Nothing to Wear Out

New Crane-Stability Gage Announced by G-E

A new crane-stability gage for use on boom-type cranes and similar equipment has been announced by the Special Products Division of the General Electric Co., Schenectady, N.Y. The new gage is designed to safeguard this type of equipment, by continuously and accurately measuring its stability, against handling loads in excess of the rated capacity at a given radius, and against extending the boom to an excessive radius for a given load. Hence its use not only eliminates dependence on the operator's judgment but also permits maximum use of the crane.

In principle, the new gage measures the tipping moment or the degree of crane stability by determining the amount of deformation in the structural member of the crane upon which a strain gage is mounted. Any deformation in the member changes a small air gap in the strain gage and, since this gage and its balancing unit form two legs of an alternating-current bridge, the change causes a deflection to register on an instrument on the indicating unit.

The complete gage consists of the strain gage and an accompanying balancing unit, an indicating unit, a constant-voltage transformer, and a boom-angle compensator. Further information on these crane-stability gages may be secured direct from the manufacturer by referring to this descriptive text.

Automotive Dictionary In English and Chinese

Because of the increasingly important role of transportation in the development of post-war China, a 252-page dictionary listing almost 10,000 automotive and related terms and phrases in English, with their Chinese equivalents, has been made available by the Marmon-Herrington Co., Inc., of Indianapolis, Ind. Calvin C. Chang, formerly of Shanghai, China, and now connected with the Public Relations Division of Marmon-Herrington, was the editor and compiler. The book has the endorsement of prominent Chinese officials, and Dr. Wei Tao-ming, Chinese Ambassador to the United States, contributed a personally hand-lettered Chinese title page.

Chinese engineering students in this country may secure copies of the dictionary, without cost, from Marmon-Herrington Co., Inc. Copies will also be sent to the Chinese government for free distribution in China, and a quantity will be donated to the United China Relief for sale to raise funds.

It's all in the Action!

VOIDS ELIMINATED—COMPACTION INCREASED with BROS WOBBLE-WHEEL ROLLERS

NOW AVAILABLE FOR IMMEDIATE DELIVERY!

Because of our ability to meet all production requirements of the U. S. Service Forces, Bros is also permitted by W. P. B. to produce a limited quantity of Bros Wobble-Wheel Rollers for civilian needs, subject to W. P. B.—1319 release from limitation order L-192. Write, wire or phone for illustrated literature and complete details.

Road Machinery Division
WM. BROS BOILER & MFG. COMPANY
MINNEAPOLIS 14, MINNESOTA

BROS *Wobble-Wheel* ROLLERS

Army Storage Area Plant-Mix Surfaced

(*Continued from page* 34)

Standing-Area Paving

The disintegrated granite for the base for the areas between the access paving was crushed to a maximum size of 3 inches, delivered to the job by the producer, spread by a bulldozer and a Caterpillar motor grader, and rolled by the same Galion roller used on fine grade. Bid on the basis of 6-inch compacted thickness and paid for accordingly, the amount of loose material necessary to obtain the compacted thickness was the contractor's responsibility.

The plant-mixed asphaltic concrete for the 2-inch surfacing for the standing areas was purchased F. O. B. job site from a local asphalt plant and placed by a Barber-Greene bituminous paver.

Major Quantities and Personnel

The major quantities involved in this contract included the following:

Excavation	3,500 cu. yds.
Grading and blading	43,000 sq. yds.
Granite base, 6-inch compacted	12,000 cu. yds.
Concrete pavement, 9-6-9-inch	21,000 sq. yds.
Asphaltic concrete	5,700 tons

The contract was awarded by the U. S. Engineers to Bonadiman & McCain, Inc., of Los Angeles, Calif., on their bid of $115,000, on November 29, 1943. The working time allowed was 45 days. B. H. McCain was Superintendent for the contractor. The work was under the supervision of the Los Angeles District Office, U. S. Engineer Department, with C. A. Mortensen as Assistant Area Engineer and C. F. Sturdevant as Principal Inspector.

Simple Cure for Leaky Cylinder Sleeve Rings

How an ingenious operator of a truck fleet used a solution of glycerine and soap for the repair of leaking cylinder sleeve seal rings is reported in the December, 1943, issue of *Bus and Truck Transportation in Canada.* Finding it impossible to get the rubbers effectively vulcanized to the sleeve when placed between the motor block and the sleeve, he discovered that a simple mixture of glycerine and soap solved the difficulty. The rubbers were dipped in a solution of two tablespoonfuls of white soap flakes and one ounce of glycerine in a quart of hot water, after which the sleeves were found to cling effectively.

Carolina Road Builders Have Affiliated with ARBA

The organization of the Carolina Road Builders Association has been completed and the group has affiliated with the American Road Builders' Association, according to an announcement by Charles M. Upham, Engineer-Director. The new association, which will serve both North and South Carolina, with headquarters at Raleigh, N. C., is headed by Nello L. Teer, Jr., of Durham, N. C., as President. Mr. Teer has been associated in business for many years with his father, a pioneer in the contracting business in the south.

Warren J. Mann of Raleigh, Executive Secretary to the North Carolina Licensing Board for Contractors, has been appointed Secretary-Treasurer. Other officers include E. H. Hines, Greenwood, S. C., Vice President; and the following governors: F. D. Cline, Raleigh, N. C.; W. E. Graham, Cleveland, N. C.; J. R. Suber, Whitmire, S. C.; and T. R. McMeekin, Cheraw, S. C.

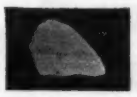
The Carolina group is already devoting considerable energy toward assisting the formulation of an adequate post-war highway program, according to Mr. Mann. Other objectives of the association are: vigorous opposition to the diversion of highway revenue; promotion of educational and other measures for the safe use of highways and streets; combat of unfair practices; encouragement of efficiency among contractors; and cooperation with other contractors' associations and with the ARBA in working for the general good of the highway industry.

From Subsoil to Surface

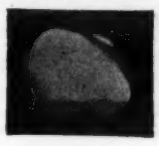
PUT CALCIUM CHLORIDE TO WORK IN YOUR PROJECTIVE MAINTENANCE

Mighty Moisture Magnet

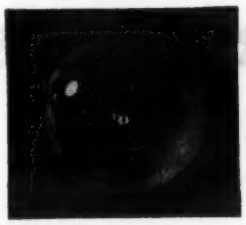
The moisture absorbing action of calcium chloride is a powerful natural force, easier to show than explain. The following picture shows how calcium chloride dissolves itself in the moisture it attracts.



This picture shows a flake of calcium chloride about twice its natural size, just as it comes out of the bag—dry, easy to spread on the surface of the road.



The same flake 24 minutes after exposure to the air at a normal summer temperature of 77° and a relative humidity (moisture content of the air) of 78%. At this temperature and humidity, a pound of flake calcium chloride will take up about 2¾ lbs. of water.



The same flake 180 minutes (three hours) after exposure to same air conditions, having completely dissolved itself in the moisture it attracted. This absorbed moisture has high evaporation resistance and non-freeze properties.

CORRECT SUBGRADE FAULTS

By eliminating frost boils and preventing detrimental heaving. Research and field work show that effective and economical results are obtained by impregnating subgrade soils with calcium chloride.

STRENGTHEN WEAK BASE COURSES

By substantial patching and extended addition of well-graded soil-aggregates, when and where necessary. Calcium chloride will: (1) Permit cutting the binder-soil fraction to a minimum, (2) accelerate compaction and (3) preserve the stability.

CONSOLIDATE LOOSE GRAVEL SURFACES

By correction of the soil-aggregate composition and calcium chloride treatment. The evaporation-resistant moisture binds the surface materials together to preserve stability and prevent gravel loss.

STABILIZE PAVEMENT SHOULDERS

By shouldering with well-graded soil-aggregates, stabilized with calcium chloride. This will provide substantial foundation for traffic turnout and base for future seal-coating.

EXPEDITE CONCRETE PAVEMENT PATCHING

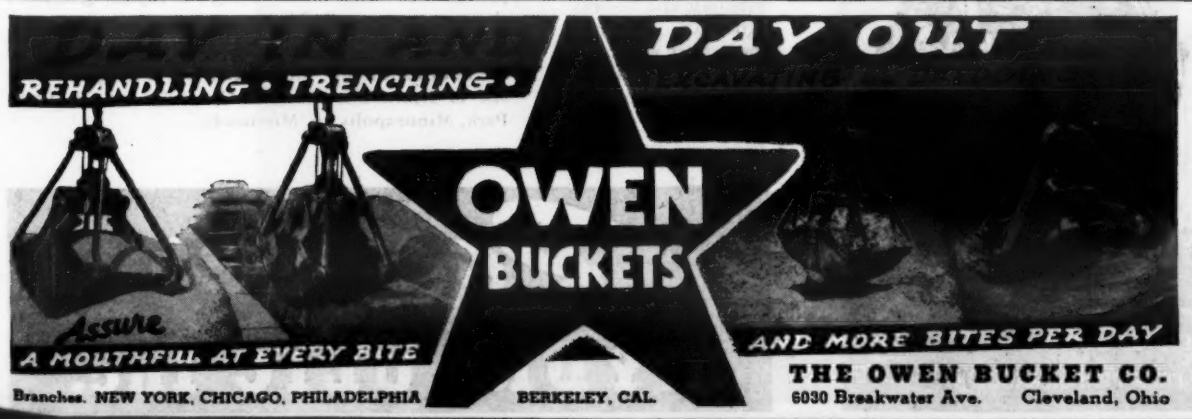
By using calcium chloride in the mix. Pavements can be opened to traffic in 24 hours because calcium chloride gives early strength and "built-in curing."

New Literature Explains Methods

A series of technical and practical working bulletins explain methods of construction and maintenance. Write for Bulletin No. 31, "Projective Maintenance" which includes a list of Bulletins available. Calcium Chloride Association, 4145 Penobscot Building, Detroit 26, Michigan.

CALCIUM CHLORIDE

FOR BETTERMENT IN ROAD MAINTENANCE



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Urban Traffic Needs Improved Facilities

(*Continued from page 32*)

the development of the arterial trunk-line, express or limited-access highway. Roads should be so located that they will pick up, carry and distribute traffic into the various areas of the city rapidly and with the least amount of interference.

The Need Is Great

The local rural road system contains over 900,000 miles of surfaced roads and over 600,000 miles of graded and drained roads. Many of these need to be improved to higher standards, while others either require no further development or are actually over-developed.

Despite the magnitude of requirements on main rural highways and local rural roads, city streets in many cases represent even higher degrees of inadequacy and often the most costly requirements for modernization. For while the recognized priority of rural highway improvements for many years necessitated principal attention to this tremendous task, the growth of urban vehicle registrations and the concentration of traffic in cities was rapidly shifting the most urgent need for highway improvement to the larger cities and metropolitan areas. Today, well over half of all traffic is on city streets and in the suburban fringes, and 28 per cent of all motor vehicles and 29 per cent of the population. The 9,500,000 motor vehicles registered in these cities number 200 per mile of surfaced street and 1,800 per square mile.

Despite these shifting needs, the long-established emphasis upon rural highway improvement has continued, until today the city and its environs constitute the most critical areas in highway transportation. For while urban highways must provide the circulatory system without which no city can survive, failure to recognize the basic role of this system in the conduct of industry and community living is dooming city after city to economic strangulation.

As one author has stated, since 1910 progress in transportation in urban territory has been as follows: Then, 10 minutes and 20 seconds by horse and buggy; now, 14 minutes and 12 seconds by automobile.

The Public Roads Administration has aptly expressed the consternation of both highway engineer and motorist in the following words:

"When one observes the countless impediments that embarrass the movement of twentieth-century traffic through eighteenth-century streets, one wonders how long it will be before complete congestion will result."

In Massachusetts, where the urban population is 82.69 per cent of the total population as compared with 19.34 in Nevada, 12.23 in Arkansas, 19.79 in Idaho, and 12.51 in Mississippi, we have a serious traffic-congestion problem. In Boston alone there should be expended approximately $35,000,000 to eliminate a very serious congestion.

Within a radius of 50 miles of the city of Boston live over 4,300,000 people. In the official Metropolitan District of Boston there are 2,350,000 people. Only four metropolitan districts in the nation outrank it in population and industrial wage earners. So we in Massachusetts have a very urgent problem in the development of urban highways, and there are countless similar situations throughout the nation.

Financing Urban Work

After this war is over, the congestion in urban territory is going to be more severe than ever before, and the sensible thing to do is to make provision for it now. However, as a city or urban territory attracts traffic from the surrounding country, it should receive aid in handling that traffic.

The majority of the cities have exhausted their credit as far as the financing of major highway programs is concerned. Consequently, relief from the states and Federal government must be sought if the long-expected problem of urban highway development is to be properly approached.

The question is one which requires some careful and delicate balancing. But we have now reached a point where the apparent neglect of the urban problem over many years makes it essential that there be some provisions made for this purpose.

It is hoped that urban development will be made as flexible as possible, leaving the final decisions with the state highway departments and the Public Roads Administration. It would be most difficult to administer an urban-development part of a Federal-Aid Act, if the provisions are rigid rather than flexible.

Of the population of 131,669,000 of the entire country, 62,716,000 are in urban communities of 10,000 or more population. Thus, approximately 50 per cent of the road-user taxes come from the urban areas.

The question is asked, and quite properly, "Where is the money coming from? Can we secure it from a nation that is veering towards bankruptcy, as some people claim?" I should like to suggest that the answer is short, simple, and conclusive. In 1942 the Federal government collected some $670,000,000 from the motor-vehicle owners of our country.

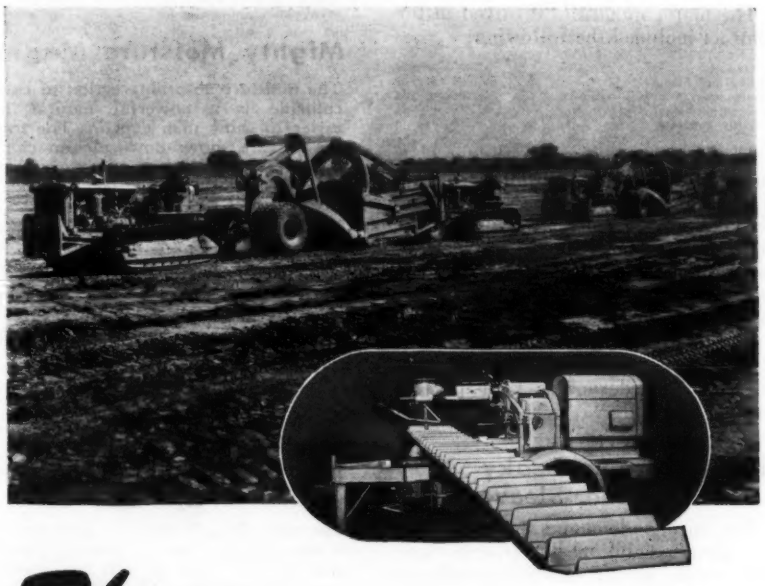
The sum collected by the Federal government in 1942 represents nearly three-quarters of the amount set forth for each year in the proposed Federal-Aid bill. Undoubtedly this program will extend into four years, instead of three. In five years, the Federal government will have collected much more than the amount required. It will have received from the motorists in the various states more than enough to finance its part of the highway program without assessing a single person or the taxpayers generally, and will have secured funds for its military highways, its aid to interstate commerce and mail, and highways for its own hundreds of thousands of motor vehicles which pay no tax at all. At the same time the Federal government would be engaged in a self-liquidating program which affects more people in every walk of life than any other effort of the government.

Let us bear these facts in mind in our planning for post-war highways.

From a statement before the House Roads Committee during hearings on the new Federal Aid bill.

New Kotel Dealer

Eastern Rock Products, Inc., 404 Court St., Utica, N. Y., well-known quarry operator and dealer in paving materials, has been made distributor for the Kotal Co., of New York City, in the Utica territory.



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BREAKDOWNS ARE COMMON. When they occur, knowing how to get the machines back on the job saves valuable time. Rodgers Track Presses answer this demand for speed. Track repairs on crawler type tractors are made in a *matter of a few hours.*

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A fit companion for this outstanding Rodgers Track Press is the Rodgers Track Wrench. This wrench may be attached to the press, using the same power as the press, which makes the removing and replacing of track shoes an easy, speedy job.

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BROWNHOIST BUCKETS GIVE MORE YEARS OF TROUBLE-FREE PERFORMANCE

Revell Heads Lincoln's Portland, Ore., Office

Announcement has been made of the appointment of G. L. Revell as District Manager of the Portland office of The Lincoln Electric Co., manufacturer of arc welding equipment. Mr. Revell has been transferred from California, where he served as welding engineer in the Los Angeles and San Francisco offices of the company, to succeed E. H. Weil, now a lieutenant in the Navy.

Another appointment to the Portland office is that of J. W. Donnelly, formerly associated with Industrial Supply Co. of Salt Lake City, who has had a number of years' experience as welding engineer at the Lincoln factory. Both Mr. Revell and Mr. Donnelly are acting as welding consultants for the U. S. Maritime Commission in the Portland area.

New Carboloy Catalog On Extended Tool Line

The expanded Carboloy line of standard, carbide form and semi-standard tools is covered in a new 30-page catalog, GT-175, which is now available. It contains prices and specifications for masonry drills, diamond-impregnated grinding wheel dressers and center grinding cones, Brinell balls, twist drill tips, guide rings and extruded rod, as well as flat form, dovetail, skiving, circular, threading, radius forming and other types of form tools. A recent addition to the Carboloy line is Grade 78C cemented carbide in which blanks 3/16 inch and over are also available. It is also noted that maximum sizes of standard plug gage bushings have been increased to 1.531; ring gage bushings to 1.510; and standard diamond-impregnated center grinding cones to 1¼ inch.

Copies of Catalog GT-175 may be secured upon application to Carboloy Co. Inc., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Please refer to this publication.

Unusual Bridge Materials As Wartime Substitutes

Indiana has shown considerable ingenuity in the use of materials to permit the completion of some twelve bridges necessary to finish active road contracts, to replace wrecked or washed out bridges, and for the repair of damaged bridges. These expedients included the use of salvaged steel spans, native timber flooring, salvaged reinforcing steel, unreinforced-concrete abutments and piers, structural timber designs, and unreinforced-concrete arches. One 65-foot span was built entirely without reinforcing steel.

Three HELTZEL Bulletins For Post-War Concrete Construction Equipment

These bulletins contain all the latest information on concrete construction equipment, **including new war-time developments.**

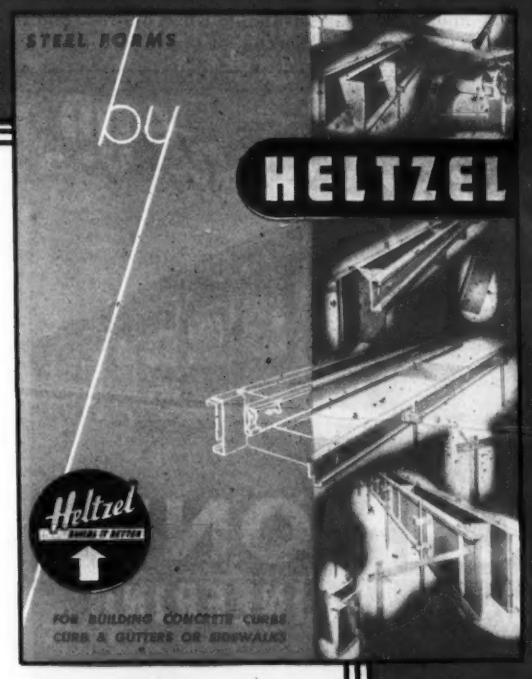
Bulletin A-20 . . . Steel Forms for building concrete curbs, curb and gutters or sidewalks. A visual demonstration of the equipment required for all types of street improvements.

Bulletin B-19 . . . Steel Forms for Concrete Highway and Airport Construction. Shows the attachments available for constructing all types of curbs, etc., at the time the pavement is laid.

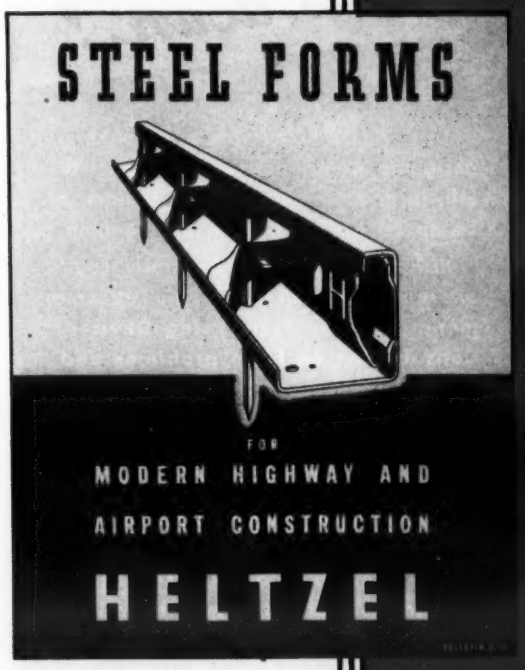
Bulletin C-34 . . . Portable Bins. Complete detail and data on batching plants from 52 to 100 tons capacity for either batch-truck or truck-mixer operations.

Catalogs and data are available for any size Central Mixing Plant . . . Truck Mixer Charging Plants . . . Portable or Stationary Bulk Cement Batching Plants or Tanks . . . Steel Storage Bins . . . Sub-grade Planers and Testers . . . Concrete Buckets . . . Joint Installing Machines and Materials.

Information that is vital to every post-war planner. Send for your copies today . . . there's no obligation.

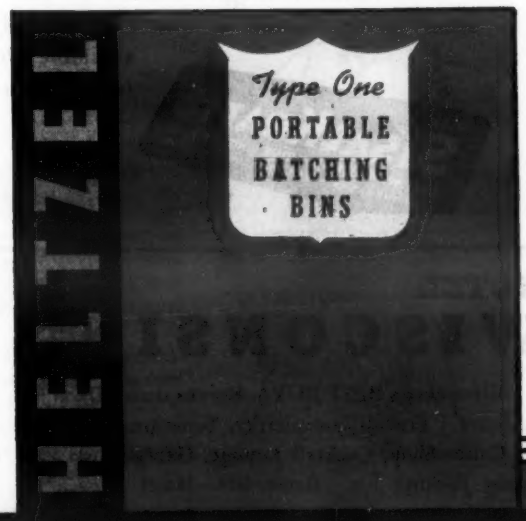


Bulletin A-20
Street Improvements



Bulletin C-34
Batching Plants

Bulletin B-19
Highway & Airport Forms



HELTZEL Steel Form & Iron Co., Warren, Ohio

Army Redistributes Surplus Materials

Approximately $150,000,000 in excess construction materials was salvaged in 1943 through the action of the Redistribution and Salvage Branch, Office, Chief of Engineers, in redistributing the material to incompleted Army projects and other war activities, according to a recent report from the War Department. Present redistribution of all excess Corps of Engineers property, both military and non-military, is proceeding at the rate of about $11,000,000 a month.

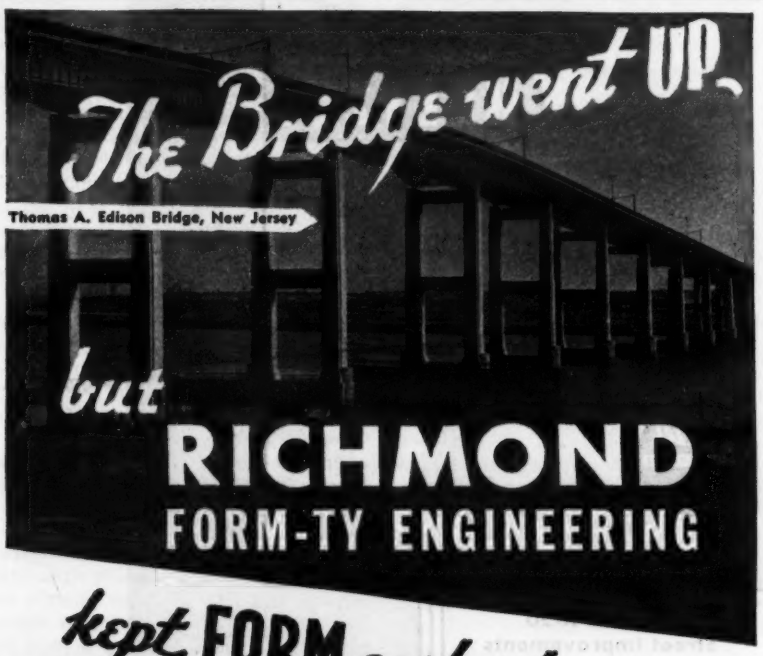
During the early days of the war when the volume of defense construction was greatest, surplus materials were readily absorbed by other projects. Early in 1943, however, as the war construction program neared completion and construction was curtailed, excess materials began to accumulate. These were utilized on whatever Army construction remained, and during the first six months of the year, materials valued at about $75,000,000 were reissued, with the specific purpose of making use of existing stocks and thus saving the cost of additional purchases.

With the further decrease in Army construction during the last six months of 1943, this method of disposal of excess equipment and supplies was no longer adequate, and large quantities were transferred to other war activities, including Navy construction projects. It is estimated that another $75,000,000 in excess construction materials were disposed of in the same manner in the last half of the year.

Galion Catalog Features Three-Wheel Road Rollers

The Galion line of three-wheel road rollers is described and illustrated in Catalog 280 recently issued by the Galion Iron Works & Mfg. Co., Galion, Ohio. Featured are the Galion Chief, a heavy-duty roller of 10 and 12 tons, with such accessories as scarifier, cab, and Roll-A-Plane available when desired, and the Galion Warrior of 6, 7 and 8 tons, also available with the Roll-A-Plane attachment, for jobs not requiring maximum weight and power. Both models can be supplied with either gasoline or diesel power. The Roll-A-Plane-equipped machine provides three rolling units, each of a different diameter. It is stated that this is particularly advantageous when surface variations are encountered, as it is possible to concentrate the weight on the center roll. Complete specifications for the two featured rollers are included in the catalog.

Copies of Catalog 280 may be secured upon request to the manufacturer. Just mention this publication.



kept FORM costs down!

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1—Provides all kinds of form-tying devices to choose from.
2—Economizes because Form Ties cost less to use than wire, band or rod ties.
3—Supplies Form Ties engineered for safe working loads of 1,500-30,000 lbs.
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5—Promotes perfect alignment for correct wall thickness.
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9—Enables you to borrow working ports and to pay only for ties in the job.
10—Is planned from job plans to use the right size of ties and the least number of ties to fit forming for fast, safe work.

SEE OUR CATALOG IN SWEET'S

Whether you are planning, designing or estimating on a concrete job—large or small—there are *Dollars* to be saved on *Form Work* by planning.

Richmond Services to Architects, Engineers and Contractors include recommendations on Form Tying Devices, Consultation on Form problems and Forming used, as well as Estimates on requirements, all without obligation.

The list of big jobs on which Richmond Form Ties have saved on form-work costs and speeded up completion is a blue-ribbon list of modern construction. It includes mammoth projects everywhere—and small contracts, too. There is a Richmond Tie engineered for every type of concrete construction. We plan a Tie to fit the work.

For information, write to our Planning Division.

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The Concrete Curing Blanket That Protects War Goods Enroute to Fighting Fronts!

This picture shows SISALKRAFT in use about four years ago on a concrete job, preventing quick evaporation and protecting the newly poured concrete.

Today, SISALKRAFT is protecting deck loads of equipment, arms, ammunition and other war supplies. In the holds of our merchant marine SISALKRAFT is protecting shipments of medicines, foods and clothing from high humidity, rot and rough handling.

The very same qualities that made SISALKRAFT the Number One concrete-curing agent are the reasons why it now protects supplies enroute to our boys "over there."

Over 24 years of proven dependability, on thousands of concrete jobs, won for SISALKRAFT the distinction of being in the specifications of 40 State Highway Departments. Contractors have used it over and over again — finally using their "old" SISALKRAFT blankets to protect subgrades and materials.

The war record of SISALKRAFT shows that this scuff-proof, weather-resistant, tough material can take amazing punishment! When Victory is won SISALKRAFT will again be available. Put it *first* on your list for postwar work!

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With Bath $2.75
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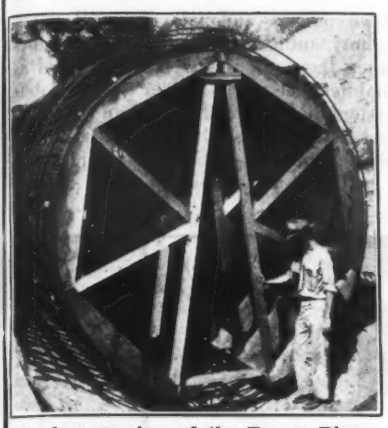


A close-up view of the Fresno River siphon inner form, showing the reinforcing in place.

Novel Siphon Form Used on Canal Job

(*Continued from page 56*)

crete was transported in two-wheel rubber-tired concrete carts over sectional wooden runways made of 1 x 6-inch boards nailed on four 2 x 4-inch stringers, and deposited in the forms through sectional tremies. Curing was by the Hunt Process.

Backfilling was done by the same Northwest crane used for excavation, assisted by a Caterpillar Thirty tractor with a hydraulic bulldozer.

Major Quantities and Personnel

Major quantities of this siphon contract included the following:

Common excavation	3,250 cu. yds.
Rock excavation	800 cu. yds.
Structural excavation (common)	21,000 cu. yds.
Structural excavation (rock)	4,300 cu. yds.
Concrete in structure	1,810 cu. yds.
Reinforcing steel	350,000 lbs.
Gates and gate hoists	13,500 lbs.

All permanently installed materials on the Madera Canal are furnished by the Bureau of Reclamation, the cement and steel being delivered at convenient railroad sidings, and aggregates in Government-owned pits. The contractor on this section of the work, however, elected to buy his concrete aggregates from a commercial producer rather than work the Bureau's deposit, and he hauled all items furnished by the Bureau.

The contract was awarded by the Bureau of Reclamation on August 10, 1943, and notice to proceed was given the contractor, Oberg Bros., Inglewood, Calif., on September 7, 1943. The total amount of the contract was $135,377.00, with 400 calendar days allowed for its completion, although one section, including the wasteway at the south side of the river, was required to be completed in 300 days. Ralph Cook was Superintendent for the contractor and the work was under the direction of R. K. Durant, Division Engineer, for the Bureau of Reclamation. R. B. Williams, Construction Engineer, is in general charge of the Friant Division.

Tested Brake Linings And Friction Material

Brake linings and clutch facings are subjected to a terrific strain by heavy-duty trucks, tractors, trailers, power shovels, draglines, cranes, and other industrial equipment. World Bestos Corp., Paterson, N. J., manufacturer of Grafild brake linings, operates an extensive testing and research laboratory in order to maintain the quality of its product. One of the innovations resulting from the laboratory work is the "balanced crystal structure" of the friction materials which prevents drum scoring and excessive wear and at the same time lengthens the life of the lining.

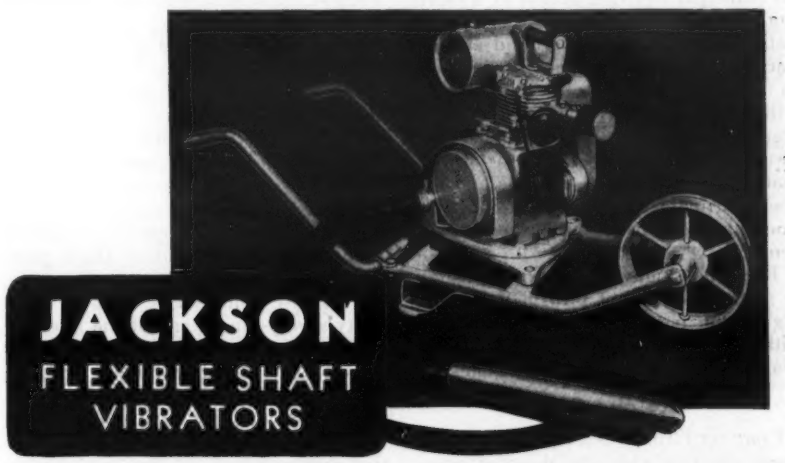
This company's products are fully described in various catalogs and pamphlets, but of particular interest to the contractor and construction executive is the latest Grafild industrial catalog which lists in convenient form the many industrial applications of this product. Supplementary information concerning brake lining and clutch facings for commercial vehicles and trucks is contained in an automotive catalog. Another informative booklet contains instruction charts for installing and servicing brake lining on all extensively used makes of brakes.

These books may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY by writing direct to the manufacturer and mentioning this item.

Glue in Timber Arches

An instance of the use of glue in the construction of timber arches is reported at the $750,000 combination cafeteria and kitchen being built at the Seattle main plant of the Boeing Aircraft Co. The arches, which were fabricated at the Seattle plant of Timber Structures, Inc., of 1½-inch fir stock dressed to ¾ inch, laminated with Laucks construction glue No. 888-P, are each 2 feet 4 inches wide at the base, with a 1-foot ½-inch wide ridge and 3-foot 6-inch wide elbow. There were ten arches in all, composed of twenty individual units. Each arch has an individual span of 92 feet 4 inches with a rise at the center of 28 feet 3½ inches, and when in place the entire area spanned will be 112 feet x 220 feet.

The building where these unusual arches are to go is a permanent-type brick-veneered structure, and when completed will accommodate 1,600 persons.



. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2⅜" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

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25 Yards at a Time . . .

● That's the way the Northern Illinois Coal Corporation—one of the nation's larger coal strippers—removes overburden from its fields near Wilmington, Illinois. Having achieved outstanding results with Page Automatic Dragline buckets, this Midwest firm has now standardized on Automatics and has in use 5, 8, 12, 14 and two 25 cubic yard Page buckets, one of which is shown above.

These giant Automatic buckets proved more than a match for extra-tough overburden sometimes in excess of 80 feet deep, and produced yardage 'way beyond what was thought to be dragline possibilities with greatly reduced maintenance and operating costs.

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Automatic DRAGLINE BUCKETS
PAGE ENGINEERING COMPANY, CHICAGO 38, ILL.

Frankly, We're Behind the 8 Ball!

Due to material shortages, and other factors beyond our control, we are unable to keep up with the ever-increasing demand for Sterling Wheelbarrows. While this apparently puts us "behind the 8 ball", as far as deliveries are concerned, we are confident our good customer friends will understand our position.

If you are urgently in need of wheelbarrows at this time, write us. We can make no definite delivery promises, but you can rest assured we'll do the best we possibly can to take care of your requirements.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A 4434-½

Contract, Day-Labor Methods Are Studied

(*Continued from page* 31)

nearly all important bonding companies. Its principal function is that of a clearing house which assembles and verifies data regarding the background and capacity of contractors. This information, in factual unbiased form, is available without cost to those charged with the responsibility for making contract awards. The Bureau of Contract Information serves a useful purpose and has been particularly valuable to construction officials during the present emergency.

Each state highway department usually maintains a file of information relating to the performance of contractors within the state and this information is available for exchange beween states.

Pros and Cons

Contract forms wherein the owner assumes the risk and pays the contractor a fee for services have been proved to be uneconomical for ordinary employment in connection with public works, and this type of contract has been limited principally to emergency use and to unusual projects where the estimation of costs within reasonable limits is impossible.

The negotiated lump-sum contract usually involves submission of a proposition by a contractor and subsequent negotiation between him and the owner, using his proposition as a basis. Purpose of the negotiation is to arrive at a lump-sum contract price acceptable to both parties. This form places upon the contractor full responsibility for completion of the work in accordance with plans and specifications and in compliance with all terms of the contract. Its principal disadvantages are that it may not develop the lowest obtainable contract price and that it affords an opportunity for favoritism or for collusion between the negotiators.

The most widely used and most firmly established means of carrying on public construction is that of open competition on a lump-sum or unit-price basis and award made to the lowest responsible bidder.

No method has ever been discovered by which public expenditures can be kept entirely free from waste and misapplication, but the competitive lump-sum and unit-price contracts undoubtedly provide the surest means of preventing manipulation, collusion and extravagant misuse of public construction money. Their safeguards, however, have evolved through many years of trial and error and can be set aside or nullified through the faithlessness or incompetence of those who represent the public.

Experience has shown that successful routine employment of the competitive contract method requires: 1. Full and clear plans and specifications available in advance; 2. Sufficient notice to prospective bidders; 3. Opening of sealed bids in public, surrounded by safeguards designed to prevent bid manipulation; 4. Prompt award at prices offered by the lowest qualified bidder; 5. Exaction of a binding third party indemnity against loss.

This last requirement, that of third-party suretyship, is one of the most important factors in the success of modern contract construction for it brings in a separate outside resource distinct from, but bound with, the contractor.

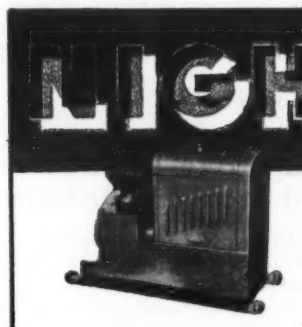
To sum up, all methods of construction mentioned above appear to have a place in an industrial nation such as this. Among them, however, the lump-sum contract and unit-price contract have best stood the test of time and have widely demonstrated their superiority from the standpoint of the public interest. They recognize the rights of private enterprise and at the same time yield a maximum return to taxpayers in the form of fixed costs, economy, satisfactory workmanship, and protection of public funds.

It is believed that one of the principal advantages of the contract system over the force-account method has its inception in the self-interest that is characteristic of human nature. Employed supervision, not having a monetary interest, does not have the same incentive as a contractor who enjoys the financial rewards and to whom losses are a personal penalty. He is spurred on by the knowledge that he must maintain efficiency or be forced out of business.

Summary

The day-labor method may be used to advantage on public works where employment must be given quickly and cost may not be an important factor. Day labor should not be used as an economy measure or to secure better or quicker construction at low cost. Types of highway work adapted to day-labor methods include clearing and grubbing of right-of-way, clearing ditches and drainage structures, improving shoulders, removing obstructions to improve sight distance, widening curves, flattening slopes, and resurfacing low-type roads. The day-labor system of highway improvement is quite universally followed by town officials, officials of small cities, county authorities, and by state bodies when the work involved is classified as maintenance work. Under the day-labor system, plans, specifications and detailed cost estimates usually are not available at the time of starting the project and

(*Concluded on next page*)



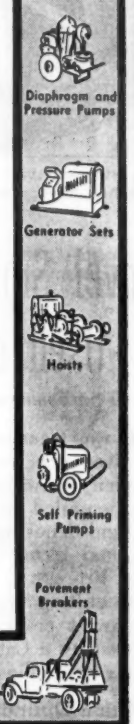
as simple as This!

N-I-G-H-T becomes L-I-G-H-T by the switch of a single letter. The switch on a Novo Generator Set can bring light to your night construction job. Flick a switch and forget the time of day.

Novo Generator Sets are job-designed for dependable, trouble-free service. The extra-capacity fuel tank and oil reservoir minimize service interruptions. A weather-proof switch-board, equipped with circuit-breaker, eliminates fuses and open switches. Novo's complete line of Generator Sets range from 1 KW to 10 KW, AC or DC. They produce plenty of steady, flicker-free power for lighting your job or operating small tools.

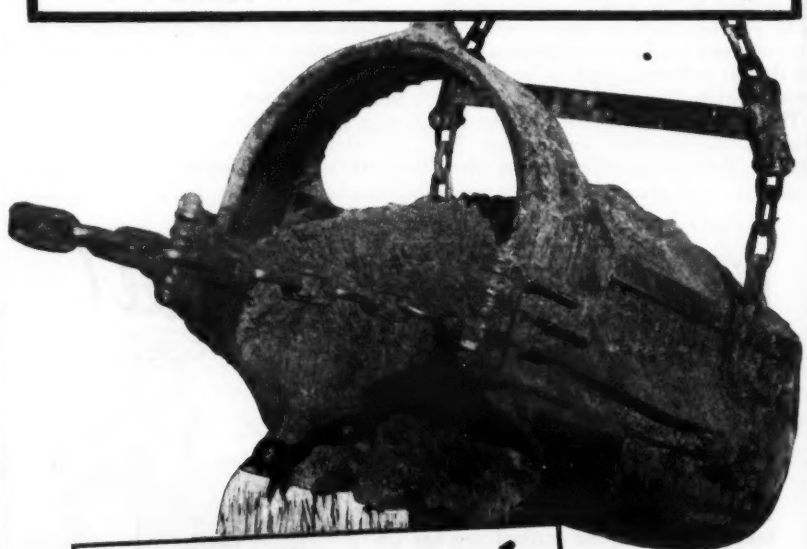
Don't let darkness put a dead-line on your work-day. Get a Novo Generator Set and change N-I-G-H-T to L-I-G-H-T

You won't be "charged" for the "current" information on Novo Generator Sets. Let us send you Bulletin No. 505-A.



NOVO ENGINE COMPANY LANSING, MICHIGAN

bigger payloads... greater digability



Lightweight

Also Available Without Perforations

To move more material, *faster*, now... and after the war... wise contractors are getting HENDRIX Lightweight Dragline Buckets. They're getting the bucket with the inbuilt qualities of toughness, durability, and strength which assure years of trouble-free service. Round perforations, lightness, perfect balance are some of the many features which help the Hendrix Lightweight give unsurpassed performance in all kinds of digging. Available in three types—light, medium and heavy duty, from ⅜ to 20 cu. yds. capacity. Write for literature... or ask your dealer.

20% TO 40% LIGHTER than other buckets, type for type. ★ ALL WELDED CONSTRUCTION for greater strength and durability. ★ MANGANESE STEEL chains, fittings and reversible tooth points. ★ GETS FULL LOAD MATERIAL EVERY TRIP... even in wet digging. ★ PERFECT BALANCE... handles easier, fills faster, dumps quicker.

HENDRIX Lightweight DRAGLINE BUCKETS

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NEW MASTER VIBRATORY SCREED

Places up to 6,000 sq. ft. of concrete per hour!

THIS new vibratory finishing screed makes possible accurate strike-off and compaction of concrete slabs in one easy operation. *No additional vibration or floating is required.* Saves time and manpower in placing floors, aprons, runways, roads and service areas. Models: VS-6 ft.; VS-10 ft.; VS-13 ft.; VS-16 ft.; VS-20 ft.; and VS-25 ft.; all models adjustable for length. Wider widths or special shape vibratory screeds to your requirements. All vibratory screeds powered by economical 1½ HP variable-speed gas engines including Master Automatic Clutch.

Write for Bulletin 596 for complete details.

1. Adjustable spring mounted shoes
2. Two way draw
3. Easy adjustment for length
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Products Include: Concrete Vibrators • Gas or Electric Surfacing Attachments, High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 2,000 Watt • Electric Equipment • Rotary Concrete Grinders • Master Finish and Cleaning Compound • Portable Gas Engine Driven Power Saw • Hammer

"Build by Contract" Efficient, Economical

(*Continued from preceding page*)

the final cost may remain unknown until long after the work is completed.

There are several distinct forms of the contract system. The most widely used and most firmly established for carrying on public construction is that of open competition on a lump-sum or unit-price basis and award made to the lowest responsible bidder. The contract system recognizes the rights of private enterprise and at the same time yields a maximum return to taxpayers in fixed cost, economy, satisfactory workmanship, and protection of public funds.

The principal reason for the success of the contract system is that, with other systems, it is difficult to obtain the same loyalty and performance from material suppliers and employees that the contractor can secure.

Suitable equipment is essential to the success of either contract or day-labor procedure.

Substantially all new Federal-Aid construction is carried out by the contract method, using the unit-price type of contract, as is substantially all new highway construction done by the state highway departments, with or without Federal-Aid, as well as street work done by the larger municipalities.

Experience covering the past fifteen years appears to have justified the practice of prequalifying bidders. The practice is considered to be helpful and capable of producing beneficial results.

Conclusion

Briefly stated, it appears that unless working conditions are favorable, supervision competent and the undertakings free from political and partisan interference, construction of new projects by day labor is likely to be high in cost and low in quality.

The tests made by the Public Roads Administration to determine the relative economy and efficiency of highway construction by contract and by day labor show that construction by contract is more economical and more efficient than when done by day labor under the supervision of public agencies.

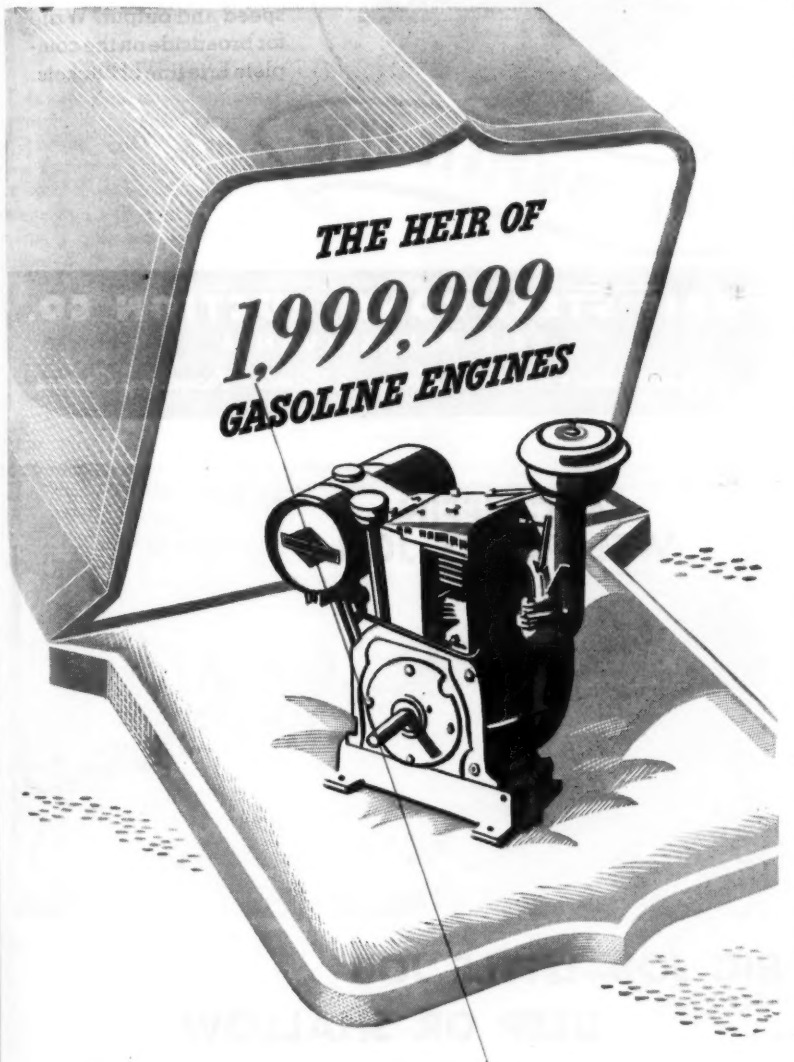
Post-War Lighting For Our Highways

Sensational articles in the daily press and magazines have led many people to believe that the return of peace will make obsolete practically everything we now have. H. E. Mahan, Manager, General Electric Illuminating Laboratory, points out that many highway and street officials hold this view in regard to highway and street lighting and are advocating the postponement of plans for post-war projects in the expectation of radical changes in light sources, luminaires and techniques.

Mr. Mahan says that probably the most radical change that can be detected in the lighting situation is a greater acceptance of highway and street lighting on the part of the public and of public officials. The experience of the dim-out has done more to bring this about than many years of educational propaganda.

Luminaires possessing the characteristics required to provide modern lighting are ready for production as soon as wartime limitations are removed. In fact, some of them were in production before the war, but because they were too far in advance of public appreciation or because of war restrictions they have been put aside for the duration. Mr. Mahan reports that no radical changes in post-war luminaires nor in the technique of application is anticipated, but that it is believed that the public is catching up with established standards of proper lighting for streets, highways, and other public thoroughfares.

The indications are that the bulk of street lighting will continue to be done with the filament lamp; that the mercury and sodium systems will gain adherents; and that the fluorescent lamp has many limitations to overcome before it is adapted to general lighting use, Mr. Mahan says.



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Air-Cooled Power

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We of Briggs & Stratton are proud of the endorsement of manufacturers, dealers and owners — and proud to be recognized as leaders in design, engineering and research, as well as precision production — the results of *twenty-five years* of continuous production of air-cooled gasoline engines.

BRIGGS & STRATTON CORP., MILWAUKEE 1, WISCONSIN, U. S. A.

HAFTRAKS · TRAKTRAILERS

LINN

CONTOUR-FOLLOWING TRACTION

are carrying loads in all climes where off-the-highway operation is required.

- Ruggedly constructed and amply powered for the toughest going.
- **From 5 to 20 tons capacity.**

THE LINN MANUFACTURING CORPORATION
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LACLEDE HIGHWAY STEELS

WIRE MESH
Slab reinforcement keeps cracks closed and holds slab together.

DOWEL SPACERS
Assures correct alignment and simple installation of shear dowels.

CENTER JOINT
For controlling longitudinal cracking of pavement.

Specify Them!!

REPORTED HIGHWAY RESEARCH INDICATES STEEL REINFORCEMENT IS NECESSARY IN PAVEMENTS FOR LONG LIFE AND LOW MAINTENANCE.

LACLEDE STEEL COMPANY
ST. LOUIS, MISSOURI

State Planning Board Coordinates Activities Of New Mexico Depts.

To coordinate the activities of the various agencies, state and Federal, which plan for the future economic development of the state, New Mexico has established by statute a State Planning Board, with offices in Santa Fe. This Board, a division of the executive branch, consists of six men, appointed by the Governor, for terms of three years, so alternated as to provide for filling two vacancies each year.

The Board was originally created by legislative action in 1935, and was active up to 1938, at which time its activities were curtailed. In 1939, the act creating the Board was repealed and the present statute enacted. The Board's activities continued until July, 1943, when by executive order the Board and staff were dissolved. In September of the same year, the Board was completely reorganized in its present form.

Its appropriation is only $7,000 annually, which is used to cover only travel and office expenses, since the salary of the director, planning technician, clerk and secretary are paid by other agencies of the state government. All employees, including the director, are appointed by the State Board for indefinite periods.

The State Planning Board serves as the correlating agency for all the state departments, institutions, counties and municipalities, most of which now have planning agencies within their own organizations. Plans instigated by all state, county and municipal agencies are reviewed and coordinated by the Board.

A survey is now being conducted to ascertain the needs of departments, institutions, counties, municipalities and other agencies whose projects are pertinent to the state's economy, for all sorts of construction equipment which may become available to states after the end of the war.

The Board is at present engaged in the preparation of a comprehensive report setting forth the needs of the state and its various subdivisions, and the possibility for future construction activities, which will not only improve the state's available resources but furnish much needed employment in the post-war period.

The present Board consists of the following: Chairman, R. R. Hinkle, Roswell, N. M.; Vice Chairman, N. B. Phillips, Las Cruces, N. M.; Secretary, W. C. Kruger, Santa Fe, N. M.; members, A. W. Boehning, Albuquerque; Lon Merchant, Capitan; and Grady Thompson, Hobbs, N. M. Vincent J. Jaeger is the Director and Trent Thomas is Planning Technician.

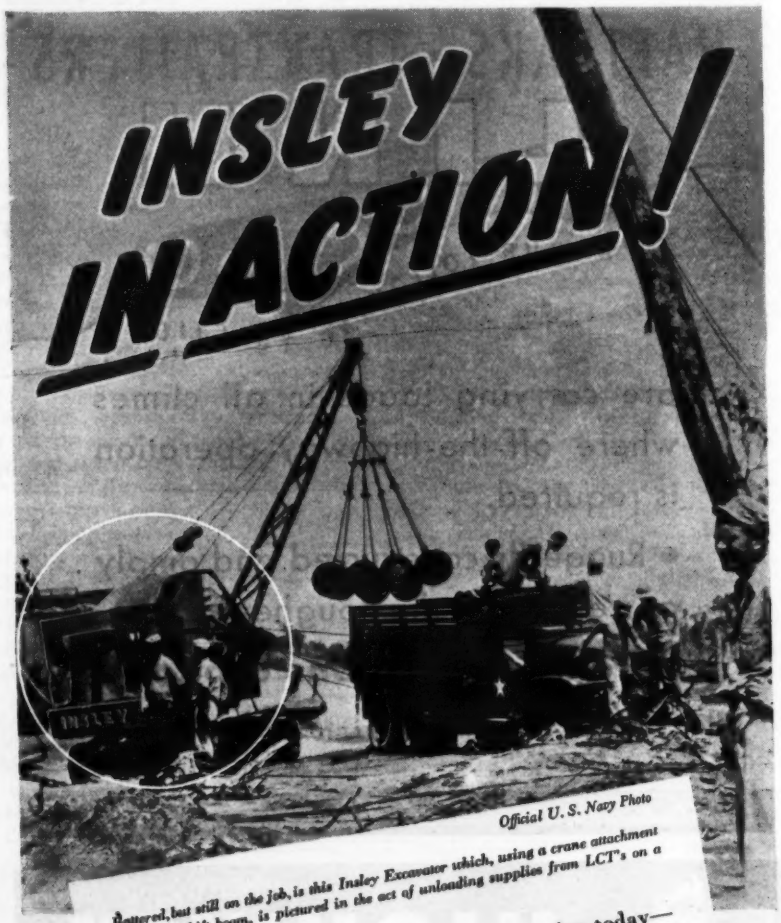
ERIE BUCKETS

• Erie builds all types of buckets in various capacities and weights to meet the job and operating conditions. Choose the correct bucket for the job and you get maximum speed and output. Write for broadside on the complete Erie line of buckets.

THE COMPLETE LINE

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

INSLEY IN ACTION!



Official U. S. Navy Photo

Battered, but still on the job, is this Insley Excavator which, using a crane attachment and make-shift boom, is pictured in the act of unloading supplies from LCT's on a South Pacific shore.

Wherever you find Insley Excavators in action today—and that includes every fighting front—you will find *fast action!*

Speed—far faster swings and dumps—has always been an outstanding feature of Insley equipment and this is one important reason why Insley's entire production is now going to the armed forces . . . because speed is the essence of victory.

After victory, when we are again able to provide Insley Excavators for your dirt moving and material handling jobs, you'll find that Insley's faster work cycle will be a vital asset . . . because speed, when it is backed with Insley's proved economy and dependability, is the essence of profitable performance.

EXCAVATORS • CRANES • BUCKETS • CARTS
INSLEY
CONCRETE PLACING EQUIPMENT

INSLEY MANUFACTURING CORPORATION
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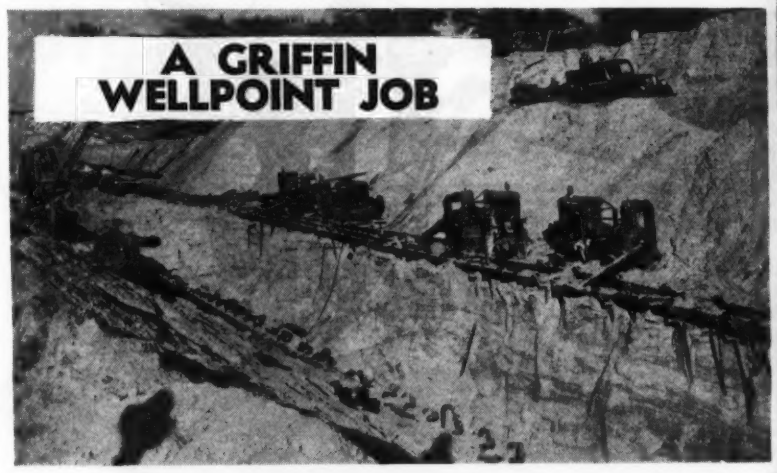

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DEEP OR SHALLOW
LONG OR SHORT RENTAL

We'll Tackle It Anywhere
and *DO IT RIGHT!*

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MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.
GRIFFIN WELLPOINT CORPORATION

Extensive Improvements To Bridgeport Sewers

(*Continued from page 65*)

Contracts XIII and XIV

Contract XIII will be for a storm sewer in Stratford Avenue, Kossuth Street, and Nichols Street, with sanitary trunks. This contract was originally part of Contract VII but was taken out to save money. However, the bids on these contracts have generally been below the estimate and enough money has been saved to put this contract back as a separate project. Its cost is estimated at $140,000.

A fourteenth contract was contemplated, to provide a storm and sanitary sewer to serve the Black Rock Housing Project in the southwest end of the city to connect to the Bostwick Avenue trunk near the disposal plant. However, arrangements have been made to handle the sewage from this project by a different method and therefore this sewer will not be built.

Contract XV

This contract is for sanitary trunk in Barnum Dike, South Avenue and Iranistan Avenue, estimated to cost $78,000. These sanitary trunks are located east of Bostwick Avenue and south of Railroad Avenue and will connect to the Bostwick Avenue trunk sewer. This construction is needed because 9,000 war workers have been added to this industrial area, requiring larger sewer facilities.

Personnel

This extensive and urgent program of sewer construction has been carried on from the start under the direction of Mayor Jasper McLevy, with J. A. Weimann, who set up the entire program, as Supervising Engineer for the city of Bridgeport, Conn. H. L. Rowland is City Engineer. Throughout the work C. R. Chisholm has been Construction Engineer in Bridgeport for the Federal Works Agency, Sub-Regional Office for the New England States in Boston, for which J. A. McConnell is Assistant Regional Director.

The entire project, including the sewers and treatment plants, is from the original plans of the former firm of Fuller and McClintock of New York City which were later developed by Harold K. Gatley, Consulting Engineer, of Oakwood, N. J., particularly those covering the completion of the Bostwick Avenue treatment plants.

Driver Training Aids By White Motor Co.

A practical contribution to the vital need for keeping wartime motor transportation moving is offered by the White Motor Co. in its Personalized Service Plan, incorporating a driver-training program to develop the cooperation and efficiency of drivers, both experienced and new. The printed aids available consist of a pamphlet outlining ways of using subsequent material, a comprehensive and authoritative manual of driving instructions and suggestions for safety, and two films designed to emphasize the importance of the truck driver's assignment, to dramatize his responsibility, and to bring home to him the need for expert driving and care of equipment.

The 158-page sturdily bound Driver's Manual is based on the experience of thousands of successful drivers, the teachings of authorities in the industry, and the results of company research. Chapter by chapter, the Manual covers all the essentials of efficient and safe driving, including preliminary inspection, correct starting, good road practices, steering methods, shifting, cruising, braking and off-the-road driving, parking procedures under various conditions, the use of brakes, and valuable suggestions on lubrication and maintenance. While the Manual, which is well illustrated, was designed as a textbook to be used in conjunction with the training plan, in itself it also constitutes a reliable reference book for experienced drivers.

The two films, "Wheels Away" and "To New Horizons", present the story of the motor truck, its importance in today's transportation problems, and the best methods of operating and maintaining it. More detailed information about these, as well as the entire Personalized Service Plan, may be secured by writing direct to the White Motor Co., 842 E. 79th St., Cleveland 1, Ohio. The cost of the Driver's Manual is 40 cents.

Recent Appointments At the S. L. Smith Co.

The promotion of H. C. Peters to the position of Assistant to the President and Vice President in charge of engineering, research and development has been announced by the T. L. Smith Co. of Milwaukee. Mr. Peters is succeeded as General Sales Manager by Robert P. Brenner who returns to the Smith organization after having served for several years as District Manager in Milwaukee for the Petoskey Portland Cement Co.

WINPOWER ELECTRIC PLANT

Model W2H — 2000 watt
Model W3H — 3000 watt
COMPLETELY ENCLOSED
(ALL METAL HOUSING)
115 Volt • 60 Cycle • 1 Phase a-c

NOT just another assembly of engine and generator, but a unit engineered and designed to insure a MOST SATISFACTORY SOURCE OF POWER for stationary or portable service.

WINDPOWER MFG. CO.
Newton Iowa

Other models and sizes—from 350 to 25,000 watts—See CATALOG.

9 DR 30's on this JOB!

U. S. NAVY OFFICIAL PHOTOGRAPH

Pneumatic tires can be had if specified by purchaser in his application for priority to Construction Machinery Branch of War Production Board.

• Plenty of rock here! So husky, maneuverable Cleveland DR30 Wagon Drills were used to good advantage at this large, west coast naval base.

Here are 7 REASONS why the DR30 IS THE MOST POPULAR WAGON DRILL EVER BUILT:

1. They drill at *any* angle and in *any* direction, flat holes from 4" to 8' aboveground, also straight up or down.
2. Feed capacity is over 8 feet, and the Cleveland DR30 handles depths to over 25 feet.
3. The recoil device holds machine to its work, and increases the drilling speed from 10 to 25%.
4. Forward leg point holds the drill and steel in line whether operating in down, flat or angle holes.
5. Centralizer keeps steel from "walking" when starting hole, prevents breakage of bit points.
6. The twin jack-screw mechanism permits easy moving of U-bar, and also shortens set-up time.
7. The main wheels swivel 90° for line drilling, and 180° in order to obtain narrower tread.

Ask for Bulletin 132

BACK THE ATTACK—BUY MORE WAR BONDS

LEADERS IN DRILLING EQUIPMENT

THE CLEVELAND ROCK DRILL CO.
DIVISION OF THE CLEVELAND PNEUMATIC TOOL COMPANY
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CANADIAN DISTRIBUTORS
Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

Division Shops Care For Road Equipment

(*Continued from page* 60)

heavy parts to all positions in the north end of the building. The shop is partially separated from the rest of the building by a partition but is not completely enclosed. Entering from the work-bench area, the visitor finds on his right a Champion drill press with 1½-inch capacity and 29-inch travel and a Black & Decker 8-inch bench grinder on a Sioux stand at his left. In the extreme northeast corner is a South Bend lathe with an 8-foot bed and 16-inch swing. A Sioux valve-grinding machine comes next down the east wall, a Champion spark-plug tester, and an Allen distributor tester and motor analyzer. Nearer the center is a Manley hand-operated hydraulic press with 30-inch travel and 60-ton capacity. In the south portion of the shop there is a Champion bench grinder which has been remodeled in the shop to handle 14-inch stones.

Against the partition wall on the west side of the machine shop is a shop-built forge flanked by a Little Giant 25-pound power hammer driven by a 1-hp Valley electric motor. South of this is a 50-pound Smith acetylene generator with a rack for the oxygen tank and two Smith torches and valves, for which tips from No. 1 to No. 9 are available, and a Model 300 Marquette ac arc welder.

Between the machine shop and the store room in the southeast corner of the main building is the rack where motors are cleaned with a mixture of hot water and high-pressure air.

Wash-Rack Wing

In the 30 x 50-foot extension to the main building is the large wash rack with both hot water and air available for cleaning, a hydraulic grease rack and three Alemite lubricating machines, a General Electric battery charger, and a Bennett gasoline pump with underground tank, while a Tokheim gasoline pump provides service to equipment in the main part of the shop. In this wing there is also an old washing machine used by the mechanics to wash their own dirty overalls as well as washing cloths for wiping equipment. This wing is well supplied with air-line outlets for inflating tires and operating a paint spray gun.

The sign shop is in one end of the old wooden shop building now used for storage and there the work of repainting metal signs made by the state penitentiary is carried on. A DeWalt bench saw is available for use in making new wooden signs. These are painted white and the black lettering stenciled on. Metal signs to be re-painted are cleaned with lye and sprayed with two coats of white paint, with the raised portions later blackened by a hand roller.

Division Equipment

Since this division shop is required to maintain 139 pieces of equipment, it must be not only well tooled but competently staffed. The equipment includes 19 passenger cars and pick-ups; 40 trucks varying in size from 1½ to 10-ton and including Fords, Internationals, Macks, FWD's, Walters, and Colemans, many of which have four-wheel drives; 14 motor graders, Warco, Caterpillar, Austin-Western, Hawkeye, Allis-Chalmers, Galion and International; 10-wheel tractors, Toro-Ford, McCormick-Deering, Oliver, and Allis-Chalmers; 3 crawler tractors, Allis-Chalmers and Caterpillar; an Austin-Western, a Caterpillar, and an Austin-Western leaning-wheel grader; 1 Snogo rotary snow plow and 19 V-type and one-way snow plows, including Galion, Adams, American, Bros, Wisconsin, Frink, Good Roads, and Wausau; 4 pressure bituminous distributors of from 400 to 1,000-gallon capacity, Standard, Rosco, South Bend and Austin-Western; an 8-cubic-yard LeTourneau scraper; a ⅝-cubic-yard Bay City shovel; a Galion 5-ton roller; and a Pioneer 18 x 44 gravel loader.

Personnel

In North Dakota equipment is repaired by the Maintenance Department, with its cost figured into the hourly use charge made against the unit. The shop described is in Division No. 1 at Bismarck, of which Harris Robinson is Division Engineer, while the entire state program of equipment repair is supervised by Ray Robinson, Maintenance Engineer, State Highway Department.

At present the Division shop staff consists of E. A. Krinke, Shop Superintendent, one clerk, one blacksmith, and five expert mechanics, one of whom spends much of his time in the field making inspections and minor repairs.

Folder Describes New Print-Reproducing Unit

A copying machine, said to make clear sharp reproductions of anything typed, printed, photographed or drawn, even when the original has insufficient line density or is worn or soiled, is announced in a folder available from the Charles Bruning Co. Inc., 4700 W. Montrose Ave., Chicago, Ill. This Copyflex 55C Continuous Printer for reproducing blueprints, layouts, maps and other engineering data up to 42-inch width is described as compact in design, easy and economical to operate.

Interested highway engineers or contractors may secure copies of this descriptive folder by writing direct to the manufacturer.

WELLMAN Williams Type BUCKETS

Welded Rolled Steel

FOR GREATER STRENGTH AND LONGER SERVICE

Wellman Buckets combine all the mechanical advantages of the famous Williams Bucket with the welded construction features formerly found in Wellman custom-built heavy duty steel mill buckets.

Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.

Multiple Rope and Power Arm Types. Dragline • Power Wheel • Dredging. Special Service Buckets ⅜ to 16½ Yd. Capacities.

THE WELLMAN ENGINEERING COMPANY
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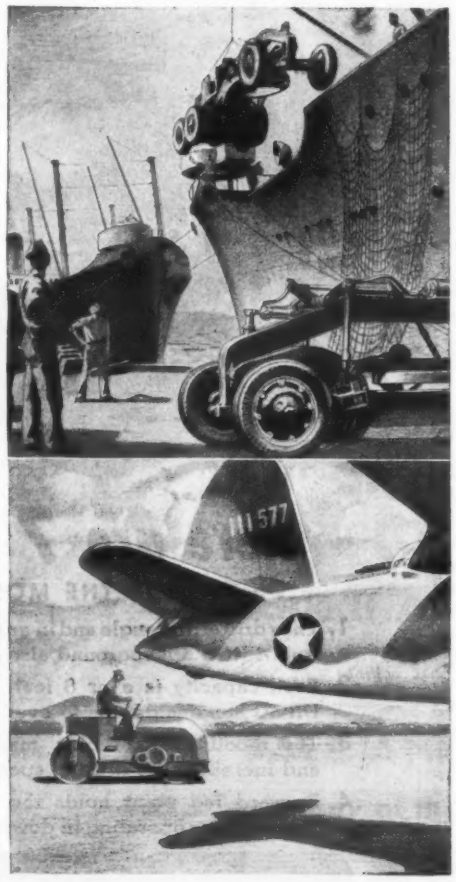
SALES AND SERVICE AGENCIES IN PRINCIPAL CITIES

WE ARE DEPENDABLE



As Dependable As The MARINES

Our fighting forces must get a heap of satisfaction out of the fact that here on the home front there are tough, hardened working men and women . . . as dependable as themselves. If we are to help them turn on the lights of the world again we must continue to fight back here—continue to go all out on the production lines.

When we read of victories it is easy enough to become complacent and self-satisfied. Actually this is bad for us—winning a race does not always mean winning at the races. Let's keep on serving our armed forces—doing the kind of a job that will lead the Marines back to Wake and Guam—that will bring them all home sooner. In doing this—let's keep our wicks clean for that brighter light in the future.

Galion continues to serve with essential equipment for the Air Force, Coast Guard, Engineers, Marines, the Navy and the Seabees.

While this war is not over by any means, it is not too early to project Galion rollers and graders into your post-war planning—when even more progressive road construction will be the order of the day.

The Galion Iron Works & Mfg. Co.
Main Office & Works: Galion, Ohio

★★ Immediate delivery on Gasoline Powered 1½ H.P., and wheelbarrow or round base mounted 3 H.P. units on suitable priority.

Easily Carried By One Man

★SAVE 7 WAYS with Mall TRADE MARK Concrete Vibrators

1½ H. P. GASOLINE POWERED UNIT

1. Place a stiffer mix and save sand, water and cement.
2. Eliminate expensive hand patching after forms are removed, because MALL vibrated concrete is free from honeycombs and voids.
3. Use less labor.
4. Finish work faster and get stronger, water-tight concrete.
5. Strip forms earlier and release form boards for other use.
6. Reduce power and maintenance costs.
7. Variable speed engine operates 8 other tools eliminating need for separately powered tools.

MALL TOOL COMPANY, 7743 South Chicago Avenue, Chicago 19, Ill.

★ Ask Your Dealer or write for literature and prices

Mall PORTABLE POWER TOOLS

C. & E. M. Photo

The Officers and Directors of the Associated Equipment Distributors at their recent meeting in Chicago.

AED Directors Meet in Chicago

An extension and expansion of services to its members resulted from the three-day meeting of the officers and Board of Directors of the Associated Equipment Distributors at the Edgewater Beach Hotel, Chicago, June 4 and 5. The wartime streamlined meeting of about thirty members of the AED, with President G. W. Van Keppel presiding, approved of constructive measures to help the members of the industry.

The Insurance Committee presented a comprehensive all-coverage plan, and a pamphlet dealing with this subject will be sent to all members. It was also announced that the Association plans to extend information on improved business methods to its membership. A uniform accounting system has been worked out and will be made optional to members. A new rental schedule, a complete compilation of rental rates for construction equipment consistent with OPA regulations, is now being prepared for release. Another service-to-members plan provides for the interchange of credit information among local groups throughout the United States and Canada.

The meeting approved publication of a 1945-46 catalog, which will be the largest and most complete cooperative catalog of its kind, according to C. F. Winchester, Executive Secretary of the AED. The directors also approved the national advertising plan set up by the Advertising Committee and will urge local and regional groups to continue and increase their use of sectional trade magazines in connection with this program.

The Nominating Committee for selecting officers and directors to be voted upon at the annual meeting next January was announced. Harry W. Fletcher, of Fletcher Equipment & Supplies, New Orleans, is Chairman, and other members are Ed. P. Phillips, Phillips Machinery Co., Richmond, Va.; and G. A. Cooper of the J. E. Ingram Equipment Co., San Antonio, Texas. There will also be fifteen advisory members to the committee, one from each AED region.

Those attending the meeting and shown in the photograph, reading around the table from the left, were: H. W. Fletcher, Chairman, Legislative Committee; C. G. Borchert, Chairman, Finance Committee; J. F. Crothers, Director, Region 15; E. F. Higginbotham, Director, Region 13; Hal M. Davis, Director, Region 10; Wm. T. Walsh, Director, Region 6; Geo. N. Beckwith, Director, Region 3; W. W. Bucher, Treasurer; F. B. McBath, Vice President; C. F. Winchester, Executive Secretary; G. W. Van Keppel, President; H. O. Penn, Executive Vice President; R. S. Patten, Vice President; A. E. Hahnan, Vice President; A. F. Garlinghouse, Director, Region 11; J. S. Gilman, Chairman, Advisory Board; John Gorman, Director, Region 1; R. H. Carter, Director, Region 4; R. S. Rosholt, Director, Region 8; J. C. Moore, Director, Region 14; E. M. Farnum, Chairman, Rental Committee; W. A. Danner, Chairman, National Affairs Committee; and F. G. Knight, Assistant to the Executive Secretary.

Welch Elected Director By Standard of Indiana

L. C. Welch, Assistant General Manager of Sales in charge of the Lubricating and Sales Technical Service Departments of the Standard Oil Co. of Indiana, has been elected to membership on the Board of Directors. Mr. Welch, an alumnus of Cornell University, has been connected with the company since 1922, and has been an executive since 1934. He is Chairman of the American Petroleum Institute Lubrication Committee, and a member of the American Society of Mechanical Engineers and the Society of Automotive Engineers.

Airco Revises Price List

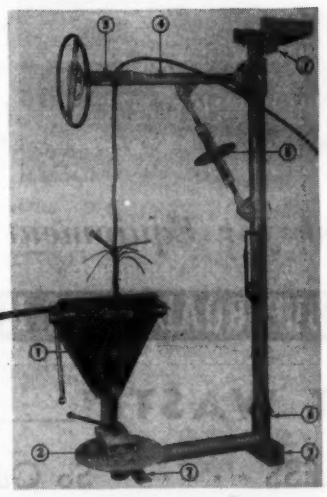
A revised illustrated 20-page price list giving prices, sizes, dimensions, weights, stock numbers and other data on gas welding rods in a wide range of metals, types and sizes, hard-facing alloys, welding cable, ground clamps and similar equipment, has been issued by the Air Reduction Sales Co. In addition, it describes several new items, including the new Suregrip Rod Saver reported to effect considerable savings in electrode costs, the Airco No. 66 welding helmet, and the Atlas Model A Dual-Tool for cleaning welds.

Copies of the revised list may be obtained by writing direct to the company, 60 East 42nd St., New York 17, N. Y., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

GAR-BRO Splicing Rig

Easily *Portable*, Self-contained

The Gar-Bro Cable Splicing Rig takes care of all the necessary operations in the splicing of a cable. Any standard splicing vise (1) can be attached to the revolving stand (2), permitting the twisting of the cable by revolving the splicing vise. An overhead quick opening type gripping vise (3) is provided, mounted on a pivoted tension arm (4) with tension adjustment wheel (5). This Splicing Rig replaces overhead chain block, grip chains and twisting bar, as commonly used, and is much faster and easier to operate. The Gar-Bro Cable Splicing Rig can be set up, lashed to a tree or post, and be working in 10 minutes. On shipboard, it may be mounted on benches for horizontal splicing. Overall size, 96"x45". Weight, without vise, 250 lbs., approx. Top and bottom members are readily detached. No section of the unit weighs over 100 lbs. Write for Bulletin No. 73.



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CONTRACTORS Make Those Small Blacktop Jobs Pay

With This $1200 DISTRIBUTOR

This efficient, low-cost Distributor opens up *new fields of profitable black top work for Contractors*--County and Township Roads, City Streets, Alleys, Sidewalks, Parking Lots, Playgrounds, Driveways and small airports.

The 600-gallon Model SJ pictured here has a 100 G. P. M. pump powered by a 15 H.P. engine. Handles any type material through spray bar lengths up to 12'. The two powerful burners pouring heat through 5" flues assure fast heating. Single lever controls all pumping operations, including Hand Spray.

The Model SJ can be furnished for truck mounting, or on its own running gear for towing.

There is a Dealer in your immediate territory. Write for Catalog RS-2142.

OTHER PRODUCTS

Asphalt Distributors • Tar Kettles • Burners • Street Flushers • Spray Units Supply Tanks • Surface Heaters • Shoulder Rollers

SALES OFFICES IN PRINCIPAL CITIES

Standard Steel Works NORTH KANSAS CITY, MO., U.S.A.

Post-War Planning Under Way in Conn.

(*Continued from page* 50)

have been added, they have even had to lay off some because of lack of funds, as the State Legislature cut the funds available for the employment of engineers for design, location, and right-of-way.

Commissioner Cox feels that, if there are a large number of small projects of around $5,000 scattered over the town systems after the war, the Department may not be able to secure enough good inspectors to man all the jobs.

Status of Plans

For some time the Connecticut State Highway Department, under the leadership of Commissioner Cox, has tried to have its plans ready for one year ahead, except possibly for some small details. At present, it is planning definitely for post-war construction and not just to care for deferred maintenance. Connecticut's roads have been maintained better during the war than perhaps for many years prior to the beginning of hostilities because of the extensive program of subdrainage in the last four or five years which has prevented the annual spring break-ups which for many years occurred from frost boils. This has made the road surfaces more stable, and with less traffic there has been a reduction in damage to them.

The first work which Connecticut will undertake after the war will be the completion of various projects which were either under contract or just ready to begin at the start of the war. Many of these were not major projects but were instituted to correct local conditions and were a maximum of 3 to 4 miles in length. Some were made mandatory by the 1941 Legislature and others were picked by the Commissioner to correct local traffic difficulties. There is also need of considerable construction on the town roads when money is available.

Assuming that there will be no heavy construction program in 1944, Commissioner Cox says that he is not afraid that Connecticut will run out of plans. "We hope to be able to keep ahead of construction with new plans. Many of the men in our design section are now working in aircraft and arms plants nearby instead of in the Highway Department and we expect them back soon after the end of the war."

Commissioner Cox reported, "As of January 1, 1944, we had completed plans and acquisition of rights-of-way for projects to an estimated value of $3,750,000. We had completed plans but had not in all cases completed the purchase of rights-of-way or projects totaling an estimated cost of $7,600,000. This figure includes the $3,750,000 figure mentioned above.

"We estimate that, as of January 1, 1945, we shall have completed plans and completed the acquisition of rights-of-way on projects to an estimated cost of $16,000,000, which is probably a conservative estimate by several million dollars. This would break down into about $7,000,000 of work on the Wilbur Cross Parkway south of Hartford; $3,500,000 of work on the Wilbur Cross Highway north of Hartford; and $5,400,000 of miscellaneous improvements to trunkline highways. All of the foregoing work is on the state highway system. In addition, we are getting out plans on approximately $700,000 of town-aid road construction, and by the

(*Concluded on next page*)

HAISS

HI-POWER DIGGING BUCKETS have the lower sheaves *non-pocketed*, and *up and above* the counterweight where they and the closing line are *out of the muck*. For rope economy too, specify HAISS HI-POWER.

Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.

Twenty-two REASONS

Why *FLEX-PLANE* Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
- More Dummy Joints Divide Contraction Openings
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- Reduces Curling
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- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
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- Provides Expansion Relief for the Hot Upper Part of the Slab

FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.

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FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U S A

How much production time have you lost freeing stuck dozers?

Every time a bulldozer tractor gets mired in the mud or hung up astraddle a log or high center, valuable production time is lost.

If the tractor is winch equipped, or if there's another one nearby that is winch equipped, it takes only a minute or two to free it. Without a winch, costly delays result!

It pays to equip bulldozer tractors with . . .

HYSTER

HYSTER TOWING WINCHES

You can't stick a winch-equipped tractor!

HYSTER Towing Winches are made for all sizes of "Caterpillar" track-type tractors and distributed and serviced by "Caterpillar" dealers everywhere.

LARGEST MANUFACTURER OF TRACTOR HOISTS AND WINCHES

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FIGHT WASTE!

USE LESS ★ ★ ★ ★ ★ So Our Fighting Forces Will Have More

Connecticut Plans For Post-War Roads

(*Continued from preceding page*)

first of next year will probably have plans complete on twice that amount. The last figure, however, is subject to uncertainties beyond our control because it is largely affected by the rapidity with which the towns enter into agreements with us for such construction."

Of the major projects which are being given serious consideration for post-war construction, one is a new highway from Hartford west and south through New Britain and then to and through Waterbury and Danbury, to care for traffic concentrations of from 4,000 to 40,000 vehicles per day. This project would be built in sections in a similar manner to the construction of the Merritt Parkway.

The second major project is in Fairfield County and would also be constructed in the more urgently needed sections first. It would take the form of a relief highway for U.S. 1, the famous Boston Post Road, and would be an additional through highway for this congested area. In addition, the State Highway Department has funds available from tolls which are expendable for construction of the Wilbur Cross Parkway south of Hartford. The Department has also acquired the right-of-way for the Wilbur Cross Parkway north of Hartford and the plans are ready but only limited funds are available for construction.

Highway Advisory Commission

Connecticut has a Highway Advisory Commission, set up by the 1943 General Assembly, to "study and advise" with the Highway Commissioner concerning highway improvement, equitable distribution of funds to municipalities, problems of the highway system, the procedures of the highway department and the highway laws to determine "the revision which may be desirable for the efficient functioning of a post-war highway program." The Commission is directed to submit its recommendations to the Governor for presentation to the 1945 session of the Legislature. It is now considering a county-by-county general plan to care for a 50 per cent increase in traffic by 1955. The difference between the results of the studies of the Highway Advisory Commission and the present highway system represents post-war construction which must be carried on between 1945 and 1955.

Safety Code Revised For Woodworking Units

For the further protection of operators of woodworking machinery, the latest revision of the safety code devised to reduce hazards in the use of this type of machinery has been approved by the American Standards Association. This is the second revision since the standard was approved in 1924, and includes provisions for the safe installation, operation and maintenance of such machinery not only in woodworking plants but in shops and on jobs where circular saws, band saws and jointers are part of the equipment. The revision sets minimum standards for safe-guarding operators, particularly of circular saws and jointers which are regarded as among the most hazardous items.

The standard is divided into seven sections: Application and definitions; plant layout; machines and equipment; "points of operation" of circular saws, band saws, jointers, sanding machines, etc.; veneer machinery; cooperage machinery; and operating rules for inspection, maintenance and protective clothing for workers. An appendix includes a discussion of the rules and recommendations for means of putting the rules into effect.

Copies of the code, which has been developed under the leadership of the National Conservation Bureau and the International Association of Industrial Accident Boards and Commissions, may be secured from the American Standards Association, 29 West 39th St., New York City 18. Price: 35 cents.

"BICKNELL BETTER BUILT"

PAVING BREAKER TOOLS

We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.

12 LIME STREET ROCKLAND, MAINE

Ever Been Up Against

OOZE, MUCK, TRASH?

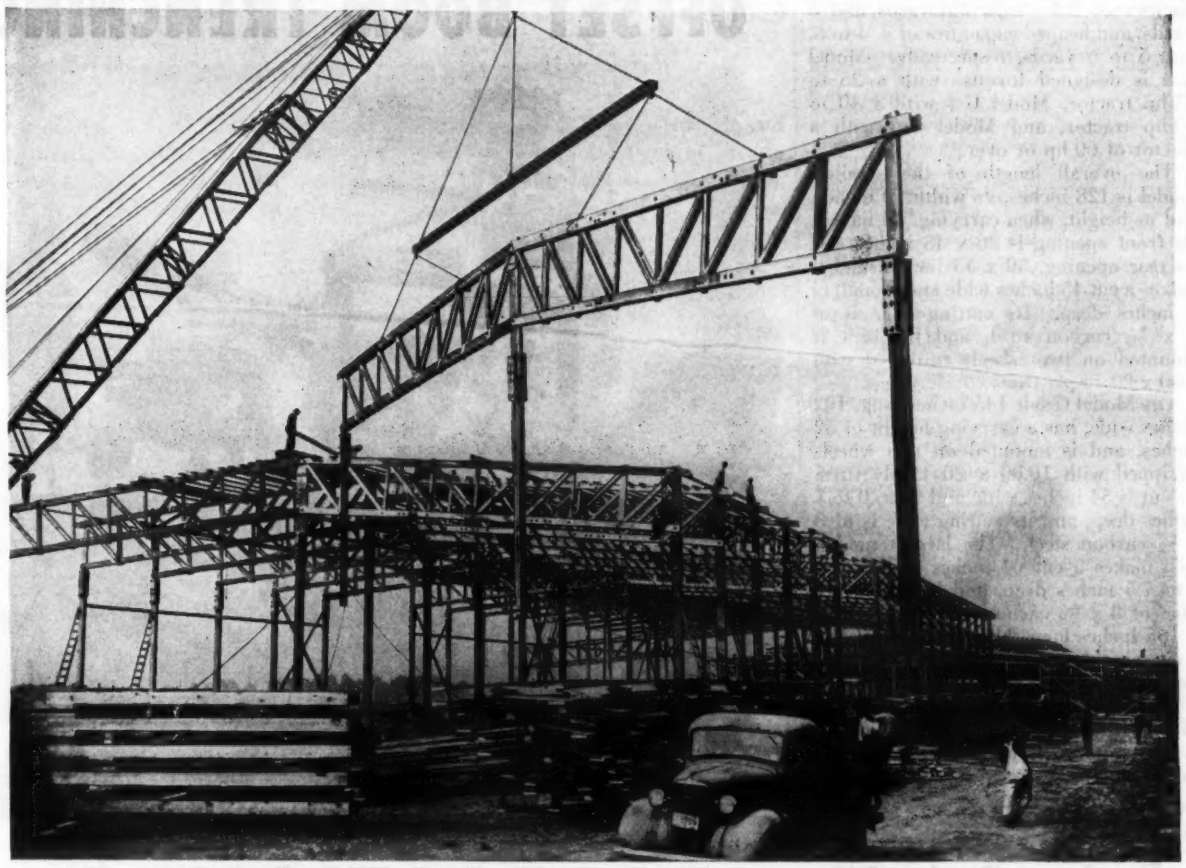
MARLOW "MUD HOG" diaphragm pumps will handle mud so heavy it could be shoveled . . . they'll take big hunks of trash without a quiver . . . they'll pump slow seepage or thousands of gallons per hour. Practically clog-proof; extra-rugged!

Ask your nearest Marlow distributor, or write for the free 80-page Marlow Pumpbook.

MARLOW PUMPS

Makers of the World's Largest Line of Contractors' Pumps

RIDGEWOOD NEW JERSEY



★ ★ *ARMY WAREHOUSES with 2,304 flat top roof trusses prefabricated and erected by Timber Structures, Inc. In all, 12 warehouses (200'x 800') were erected by a crew of from 50 to 75 men at an average time of 5 days per warehouse.*

ERECTION IS IMPORTANT

...BUILD WITH TIMBER STRUCTURES

The final test of Timber Structures service to contractors, engineers and architects is the efficiency with which buildings can be erected. All along the line, from first blueprints, through plant prefabrication, inspection, assembly and shipment to jobsite, every step must be coordinated so that erection requires a minimum of time, machinery and manpower. How well this is achieved is illustrated by these typical examples:

1. For an aircraft hangar, an 85' boom mounted on Caterpillar traction was the only erection equipment needed for putting seven 162' glued laminated roof trusses in place.
2. A shipyard mold loft 240'x 130' was erected in its entirety in four 8-hour shifts.
3. Working hundreds of miles from civilization, a 420' permanent timber bridge was erected on the Alaska Highway with efficiency and dispatch.

Key erection men are available from Timber Structures if desired. They are thoroughly familiar with erection procedure for all types of buildings.

Erection is but one feature of our "Engineering in Wood" policy. Others are research, design, engineering, prefabrication, inspection, transportation. All are responsible for the construction speed, economy, strength and permanence of roof trusses and other items furnished by us.

We invite inquiries as to work performed and as to our ability to serve you in timber and allied structural materials. Write for literature.

Engineering in Wood

TIMBER STRUCTURES INCORPORATED

Portland 8, Ore. New York 17, N.Y.

A Hi-Lo scraper on a dirt-moving job near Amarillo, Texas.

Hydraulic Scrapers For Dirt-Moving Jobs

Three models of Hi-Lo hydraulic scrapers for use on a variety of dirt-moving and grading jobs are made by the Wentz Equipment Co., Inc., Topeka, Kansas. Known as Models G-3, G-4, and G-5, these scrapers have struck capacities of 2.3 yards, 3.8 yards and 5 yards, and heaped capacities of 3, 4 to 5, and 5 to 6 yards, respectively. Model G-3 is designed for use with a 25 to 35-hp tractor, Model G-4 with a 40 to 60-hp tractor, and Model G-5 with a tractor of 60 hp or over.

The overall length of the smallest model is 128 inches, its width 90 inches, and its height, when carrying, 43 inches. Its front opening is 20 x 45 inches and its rear opening, 39 x 45 inches, and it makes a cut 45 inches wide and from 0 to 6 inches deep. Its cutting edge is of 6 x ½ carbon steel, and the unit is mounted on two wheels equipped with 9.00 x 20 10-ply tires.

The Model G-4 is 145 inches long, 102 inches wide, has a carrying height of 52 inches, and is mounted on two wheels equipped with 10.00 x 20 12-ply tires. Its cut is 54 inches wide and from 0 to 7 inches deep, and its cutting edge is of 8 x ½ carbon steel. The largest model, G-5, makes a cut 64 inches wide, from 0 to 7.5 inches deep, and has a cutting edge of 8 x ⅝ carbon steel. This unit is 165 inches long, 119 inches wide, has a carrying height of 58 inches, and is mounted on 14.00 x 20 12-ply tires.

Further information on this line of Hi-Lo hydraulic scrapers may be secured by those interested direct from the manufacturer by referring to this item.

Care of Air Cleaners For Long Engine Life

Air cleaners are put on engines to prolong their life and performance by preventing dirt and grit from getting into the engine, causing excessive wear on all operating parts. However, the installation of an air cleaner is not enough. As the Donaldson Co., manufacturer of oil-washed air cleaners, points out, for these cleaners to do their job, the operator of the engine is of necessity charged with the responsibility of giving the air-cleaner equipment regular and constant attention in accordance with instructions.

For example, the air cleaners on engines on tractors and similar construction equipment operating under excessively dusty and dirty conditions should be serviced daily by removing the oil cup, emptying the oil, scraping out the dirt, filling to the oil-level bead with fresh engine oil, and replacing. The oil cup should never be removed while the engine is running. On engines operating in less exposed locations, the air cleaner should be serviced at least weekly.

The best performance of the air cleaner is obtained by keeping the oil level up to the bead on the cup. Raising the oil level above this point does not increase the efficiency, and never use oil heavier than that used in the engine crankcase. It is absolutely necessary to change the oil and thoroughly clean the cup whenever the level of dirt accumulated in the bottom of the cup reaches ½ inch, or the oil appears too thick or heavy to spray properly. Daily inspection is necessary to enable the operator to see when any one of these conditions has been reached.

Ordinarily, if the correct oil level is maintained with the proper grade of oil, the wire screen filtering element will need very little attention, the manufacturer states. However, the bottom of the screen should be inspected whenever the cup is removed and any accumulation of dirt or foreign matter removed. All connections between the air cleaner and carburetor should be inspected at frequent intervals and must be kept tight.

If a Donaldson collector pre-cleaner is used in connection with an oil-type air cleaner, it is not necessary to service the air cleaner so frequently, although it is still wise to make the daily inspection. The pre-cleaner, which has a glass jar for a dust receptacle, must be serviced regularly. As soon as the jar becomes half full, it should be emptied, and when replaced should be screwed on tight. No oil should be used in the pre-cleaner jar.

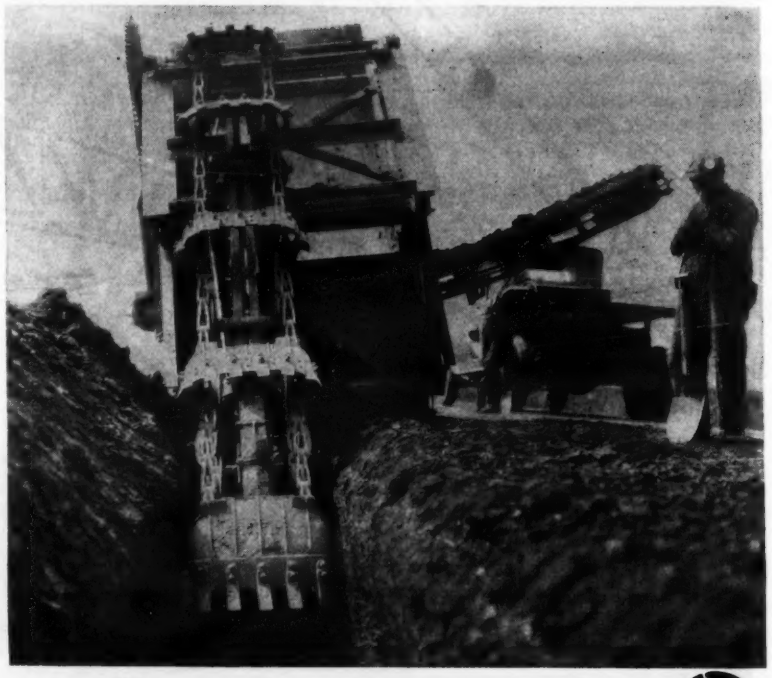
Further information on the line of Donaldson air cleaners and pre-cleaners to protect engine parts from excessive wear from dust and dirt, and on the care and servicing of these cleaners, may be secured direct from the Donaldson Co., Inc., 666 Pelham St., St. Paul 4, Minn.

Drain and Neslage Named Sullivan Vice Presidents

An announcement has been received from the Sullivan Machinery Co., Michigan City, Ind., of the election of J. A. Drain and O. J. Neslage as Vice Presidents of the company. Prior to his appointment, Mr. Drain acted as Assistant to the President, and as Vice President will be in charge of Product Engineering, Research and Development. Before joining the Sullivan organization, he was President of the Stefco Steel Co.

Mr. Neslage has served as Branch Office Manager in various Sullivan district offices throughout the United States and Mexico, and during the past year was General Sales Manager. In his present appointment he will be in charge of sales in the two countries.

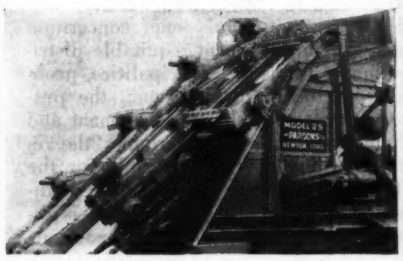
OFFSET BOOM TRENCHING *Saves Time!*



● Avoid costly hand excavation on difficult trenching by using a Parsons Trencher.

The offset boom, standard on Parsons Trenchers, makes it easy to dig close to steep banks, near trees or poles and next to curbing. The trench may be cut on line with the outside edge of either crawler just as efficiently as with the boom in center position.

It takes but a few minutes to shift the boom to any position across the width of chute. The shift is positive through its rack and pinion mechanism and the boom is held solidly with heavy bolts through boom and carriage frame. This is only one of the superior Parsons features.



TRENCHING EQUIPMENT PARSONS THE PARSONS COMPANY NEWTON, IOWA

SEGREGATION...Enemy of Good Concrete

RANSOME 34E SINGLE AND DUAL DRUM PAVERS ARE HYDRAULICALLY CONTROLLED!

In the basic design and construction of Ransome Pavers, every means is employed to prevent segregation of the batch which would affect the quality of the concrete produced.

The Ransome Hydraulically Controlled Boom Bucket is provided with gates that slide out of the path of the concrete when the bucket is discharging, giving it full unimpeded flow to the subgrade. The bucket gates can be opened to any degree permitting good spreading action, or dumping of part of the load thus eliminating split batches.

This is but one of many important features found only on Ransome Pavers. On your next paving job, use a Ransome.... We will be glad to give more reasons why you should.

CONSTRUCTION EQUIPMENT DIVISION Ransome MACHINERY COMPANY DUNELLEN, NEW JERSEY SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION

Forest Service Depot Maintains Equipment

(*Continued from page 53*)

performed and pending, as well as information about parts needed, ordered, and whose receipt by a certain date is essential to the program. With these reports from the branches and records at the depot, an estimate of man-hours required to complete work on time is prepared and compared with the man-hours available. If this shows there will be unavoidable delays, fire equipment is given first priority, with maintenance and construction equipment following in that order. A weekly check is made on progress in relation to the planned schedule.

When a fire occurs in one of the National Forests served by the Arcadia Depot, the normal work week of six 8-hour days ceases to exist. Shop operations continue 24 hours a day and 7 days a week. As many as 52 pieces of equipment, mostly trucks transporting fire fighters, both newly hired laborers and supervisory personnel who had been brought in by air from other National Forests, have been dispatched in a single day to the scene of a fire.

Personnel

In addition to the clerical employees previously mentioned, the normal force at Arcadia is sixteen automotive mechanics, fifteen heavy-equipment mechanics, two blacksmiths, one painter, three welders, one body-fender man, five laborers, and a truck dispatcher. The Equipment Depot at Arcadia, Calif., is under the direction of Verl Jeffrey, Depot Area Superintendent, with Henry S. Thorne as Supervising Mechanic.

Production Awards

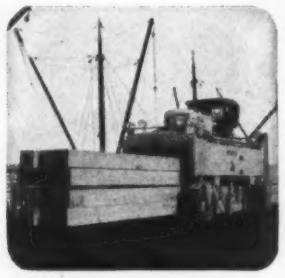
The Army-Navy "E" Award for excellence in production was recently made to the Iowa Mfg. Co., Cedar Rapids, Iowa, manufacturer of crushers, rock and gravel plants, material-handling equipment, and asphalt mixing plants.

The Caterpillar Tractor Co., Peoria, Ill., has for the second time been given the Army-Navy Production Award, thus adding a white star to its "E" flag for continued high standards of production for the armed forces.

For the third time, the Barber-Greene Co., Aurora, Ill., has won the Army-Navy Award for high achievement in the production of war material. An undisclosed number of airports were constructed in North Africa with Barber-Greene equipment last year, under the personal direction of Bruce Ross, Barber-Greene Materials Engineer, loaned to the Army as a Technician.

The Maritime Commission "M" burgee has been given to the steel plant of the Kaiser Co., Inc., near Fontana, Calif., for its outstanding production record.

How Clutch Developments for Battleships Will Help Make Better Road Machinery



Give your peacetime products the benefit of power transmission experience we have gained while equipping wartime machines. Our engineers are at your service to help design and specify applications using —

ROCKFORD *OVER CENTER and SPRING-LOADED* **CLUTCHES** *and* **POWER TAKE-OFFS**

Designed for rugged service, ROCKFORD Over-Center, Spring-Loaded and Pullmore CLUTCHES and POWER TAKE-OFFS have a wide range of uses in road machinery. Simple and compact, they fit readily into machine design. Made from specially adapted materials, they transmit the abundance of power that road equipment needs to work long and satisfactorily, under adverse conditions.

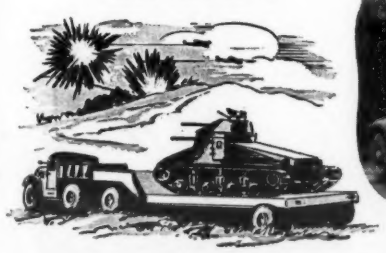
Send for These Power Transmission Bulletins

Read how Rockford power transmission engineers have made ROCKFORD CLUTCH and POWER TAKE-OFF applications that have improved the efficiency, economy and service life of road machinery. They give specifications, dimensions and capacities. Don't worry over power transmission problems. Let our engineers help you design power transmission applications that will give your product competitive advantages.

ROCKFORD DRILLING MACHINE DIVISION BORG-WARNER CORPORATION

▼ 403 Catherine Street, Rockford, Illinois, U. S. A. ▼

YOUR PEACETIME JAHN TRAILER WILL BE BETTER BECAUSE OF BATTLEFRONT PROVING GROUNDS



Any Axle or Wheel Combination

DAY AFTER DAY, hundreds of Jahn trailers are speeding the movement of tractors, bulldozers, power shovels, tanks, and many other heavy pieces of war equipment on battlefronts all over the world. They are building up a store of experience that will mean even more payload per pound of peacetime trailer.

Deep, wide flange beams, multiple oscillating type rear axles which provide equal distribution of load over all tires, heavy bearings, springs and wheels enable Jahn trailers to stand up under heavy road shocks and carry occasional overloads. For your peacetime heavy duty trailers come to trailer headquarters now.

JAHN Heavy Duty TRAILERS in Capacities from 5 to 100 TONS

"Come to Trailer Headquarters"

C. R. JAHN COMPANY

1347 WEST 37th PLACE • CHICAGO 9, ILLINOIS

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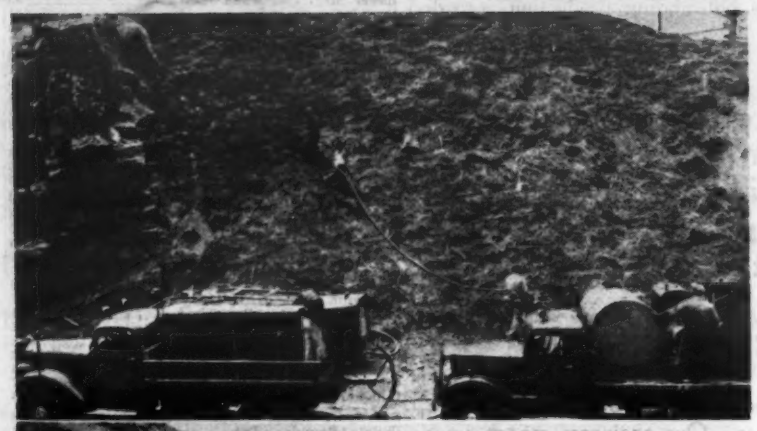
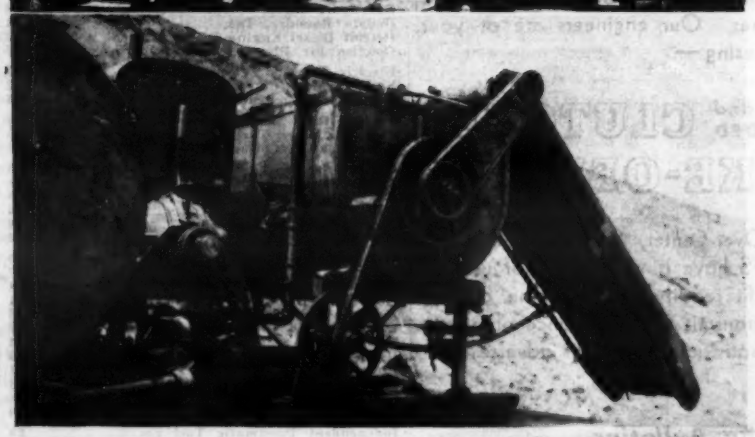
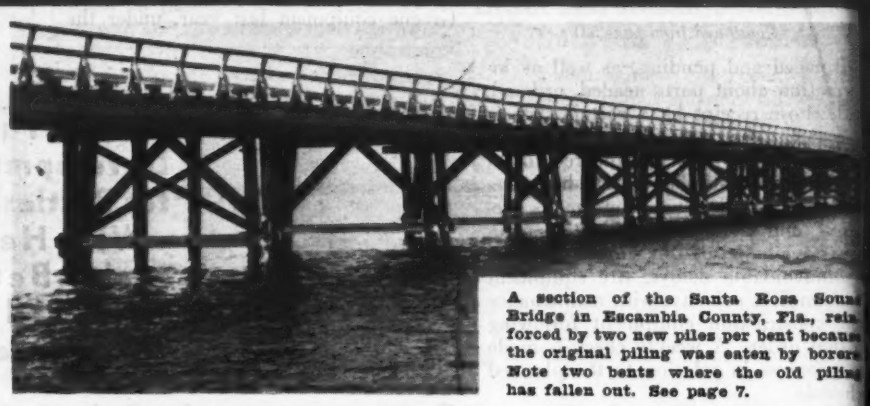


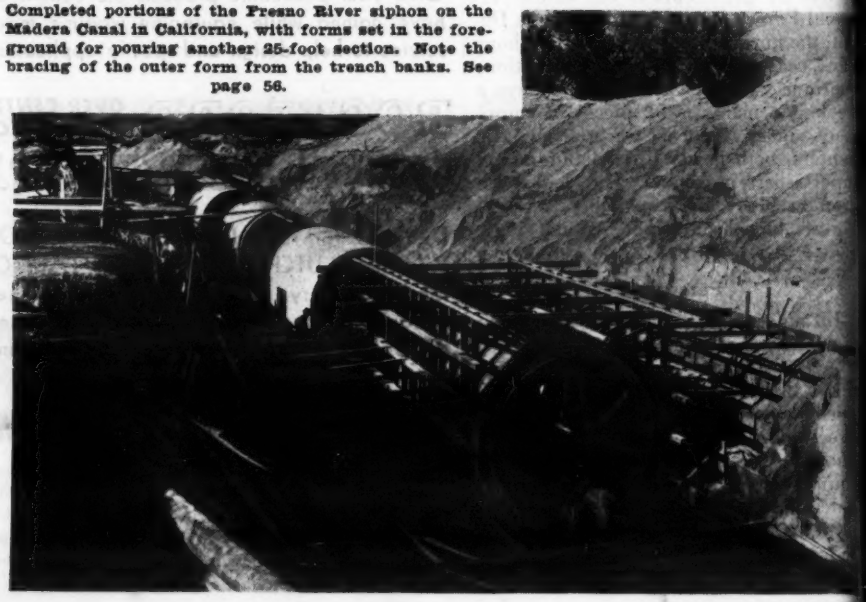


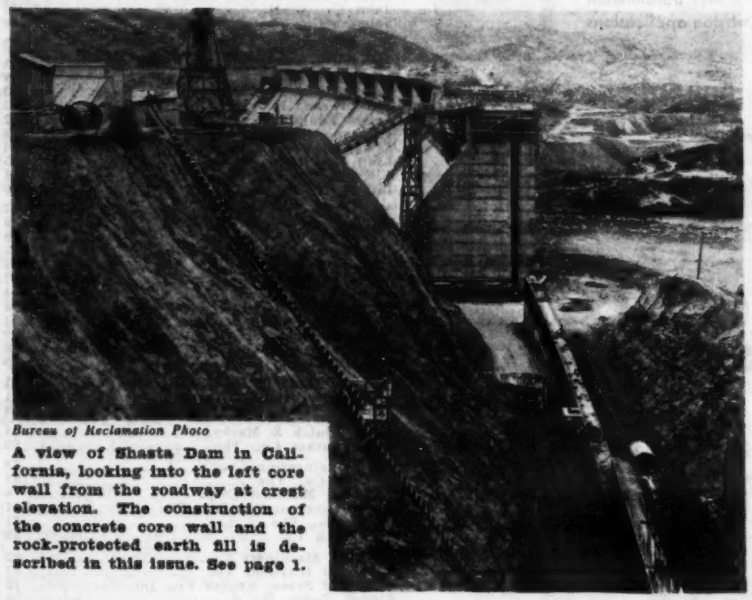
Seeding of high backslopes along Connecticut highways is done more speedily and economically by the mobile spraying unit, shown in the lower photo with the guard off the drives, which was developed by highway department mechanics for spraying seed and fertilizer on the mulched slopes. See page 9.



A section of the Santa Rosa Sound Bridge in Escambia County, Fla., reinforced by two new piles per bent because the original piling was eaten by borers. Note two bents where the old piling has fallen out. See page 7.

Completed portions of the Fresno River siphon on the Madera Canal in California, with forms set in the foreground for pouring another 25-foot section. Note the bracing of the outer form from the trench banks. See page 56.





Bureau of Reclamation Photo

A view of Shasta Dam in California, looking into the left core wall from the roadway at crest elevation. The construction of the concrete core wall and the rock-protected earth fill is described in this issue. See page 1.

Rock salt recently applied to this Elbridge Township, N. Y., road stabilized the wearing course, giving a firm hard surface that has not raveled in dry weather or turned muddy after heavy rains. See page 41.

Two views of the 1½-ton pick-up truck owned by the Arcadia, Calif., Equipment Depot of the U. S. Forest Service and especially rigged for field work. The collapsible frame serves as a crane for handling heavy assemblies. On the running board are the welding-gas cylinders and, as shown in the photo at the left, a locker with drawers for tools. See page 12.